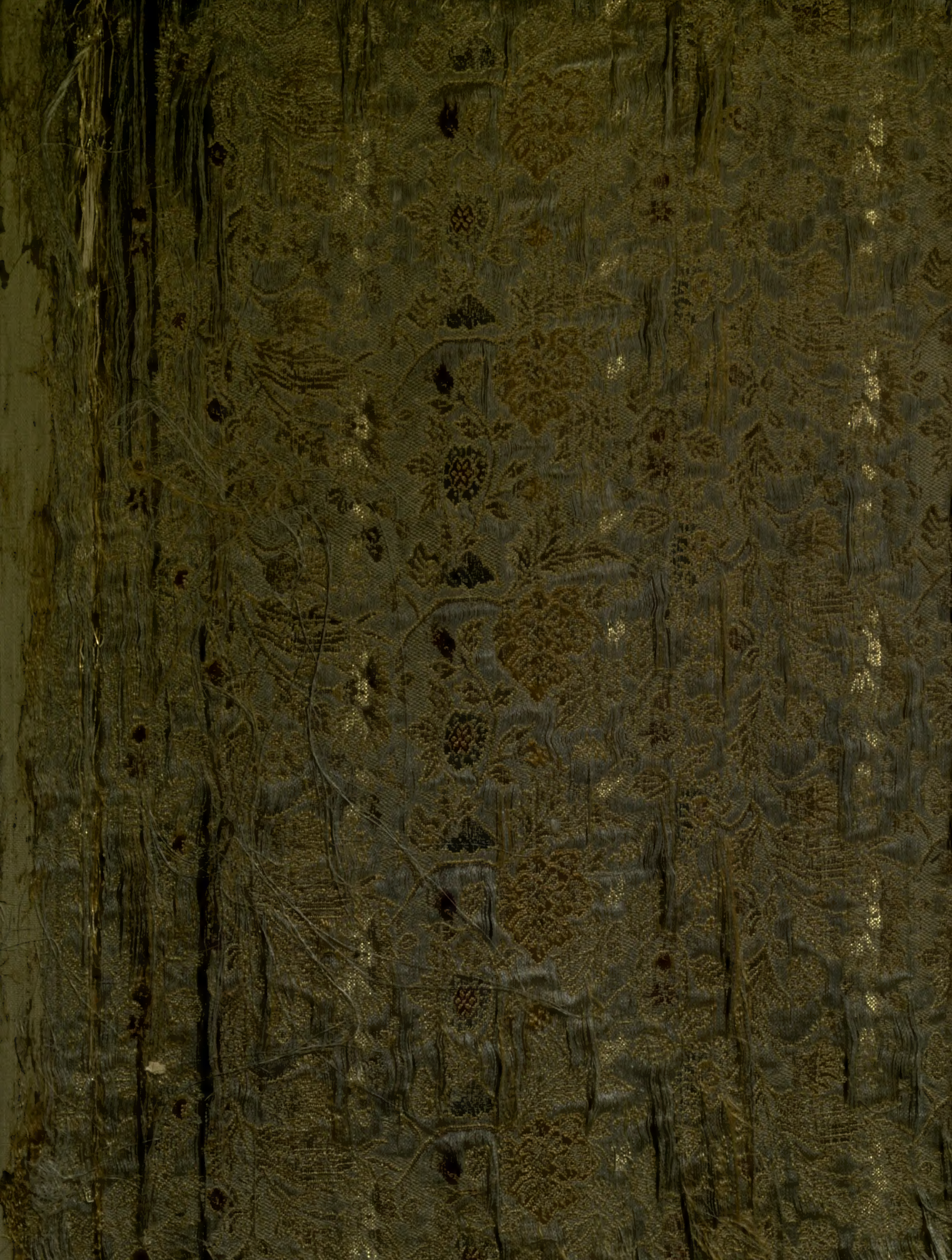



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THE STRUCTURE AND CLASSIFICATION

of the

INFUSORIA ASPIROTRICHA

(HOLOTRICHA AUCTORUM)

by

W. Schewiakoff

Memoire Academy of Sciences of St. Petersburg,

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Translated

by

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Microbiology

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Division, all Infusoria (more directly Ciliata) into Anoikeia or those without digestive tract and Enteroia or those with digestive tract, he refers to the first division, Anoikeia, in addition to the Acinetina, Noctiluca and Vampirellum, all the Multipoda, Mastigophora, Bacteriacea, Diatomacea and Desmidiacea, to the second division, the Enteroicia - now called the Ciliated Infusoria, but also some Rotifera and Bacteria. This last division(Enteroicia) he divides according to the relative position of the mouth and anus into 4 groups: 1) Anopisthia- those mouth and anus lie side by side in one common cavity;- 2) Amphitrichia - those mouth and anus lie at opposite ends of the body;- 3) Allotoria - those mouth and anus only [redacted] placed at the end (at the pole) of the body and 4) Catotricha -those in which mouth and anus occupies a polar position but lie on the side of the body. Each of these groups he divides again into 2 subgroups: Nuda those without covering and Loricata , those with covering.

By thus at the foundation of his classification laying down two criteria, of which one, was inessential and with difficulty observed (the position of the anus) - Ehrenberg erected an entirely by artificial system. As a result, in one group or even family sometimes forms having very little in common (e. g. Stentor, Prorodon, Didinium, Nassula and Spirostoma, Coleps,

Amphileptidae, Litonotus), while forms closely allied in structure fall into entirely different groups (e. g. Spirostomum and Stentor, Coleps and Didinium, Chilodon and Chlamydodon). The classification of Infusoria of the Polygastrica of Ehrenberg presents a collection of 11 families and 40 genera. (All Miliopoda, Astigmata and Sacculi i. e. the majority of the Ingesta, I leave out as not having a bearing on this work.

I. System of Ehrenberg.

I. Anenterata.

1. Fam. Cyclidina (Cyclidium, Enteridium).

II. Enterodela.

A) Holopleura.

a. Fam. Vorticellina (Stentor, Trichodina, Urocentrum, Vorticella, Carchesium, Epistylis, Opercularia, Lootrammium).

b. Fam. Ophrydina (Ophrydium, Tintinus, Vaginicola, Cothurnia).

B) Enantiotreta.

4. Fam. Enchelia (Enchelys, Bisoma, (Actinophrys, Trichodiscus, Podophrya), Trichoda, Lacrymaria, Leucophrys, Holophrya, Prorodon).

b. Fam. Colepina (Coleps).

C) Allotreta.

6. Fam. Trachelina (Trachelius, Loxodes, Dileptus, Prostomum, Trachelius, Bisoma, Chilodon,

...ssula).

7. Fam. Spirodiscina (Trachelocerca).

8. Fam. Aspidiscina (Aspidisca) .

4) Catotreta.

9. Fam. Colpodea (Colpoda, Paramaecium, Amphileptus, Trichophrya, Opalina).

10. Fam. Chytriolina (Chytriolna, Ceratidium, Aelosoma, Urostyla, Stylonychia).

11. Fam. Euplota (Discocephalus, Himantosoma, Chlamydodon, Euplotes).

The study and system of Ehrenberg, received at first with great interest and enthusiasm by every investigator in the world and finding many successors and imitators met with a serious opponent in the person of the French investigator F. Dujardin. In the year 1835 Dujardin, as is well known, found in sea sand the many chambered and subsequently also the one chambered Infusoria, the so called Foraminifera of Orbigny, and, unfortunately with their study he came to the conclusion that their body consisted of a kind of organic substance called by him Sarcode. Having discovered these forms, in the highest degree simple in their organisation, he joined them with Ehrenberg's familiesAmoebaea and Arcellina in a single class calling them Rhizopoda.Even so simple an organism Dujardin incorporated with the rest of the Polygastrica of Ehrenberg and at first denied even the presence of mouth and anus in the Infusoria. Having studied them thereafter more carefully Dujardin made an important correc-

[illegible] Ehrenberg's observations [illegible], however, a little different from the present ideas on the organization of Infusoria. Denying the existence of a digestive tract, of blood vessels, of a nervous system, of eyes and of all the organs of Infusoria, Dujardin acknowledged in them the presence of muscular tissue, and also regards to the ends he decided that an intermediate from the mouth it did not exhibit a constant differentiation [illegible] tissue; that the different methods for the reception of food [illegible] the organization and moving in the body of the food [illegible], digesting it [illegible] by their real meaning. The use of the contractile vesicles was also understood aright, regarding them as organs of respiration.

Not the least of the merit of Dujardin's work, is comprised in this that he placed in the foundations of the classification of Infusoria organic locomotion, which, as is known, is found in close and immediate connection with the general organization of the body and, in our time, serves as the distinctive characteristic of separate classes and divisions of Protozoa. Moreover Dujardin's system does not suffer, appearing in this, in the least, from the artificiality from which Ehrenberg's system entirely suffered, because after having studied thoroughly the genus Colepe, he divides the classification of Infusoria into two groups corresponding with the Bacteria, the Rhizopods and the Flagellates.

Dujardin divides all Protozoa or as he called them Infusoria into two groups: Symetrical (to which he referred the genus Colepe) and Asymetrical (to which he referred all the rest of the Infusoria). He divi-

Kahl's order again into 3 families which are given different names. To the first division he refers the Trichida, to the second the Prostomata, to the third the Hypotricha and to the fourth and fifth division Heterotricha and to the sixth division Oligotricha. The last six divisions contain 11 families and 43 genera.

2. The system of Bütschli.

1st division.

1. Fam. Enchelyina (Acoema, Amphileptus, Enchelys, Lacrymaria, Trachelius, Trichodina, Urotricha (Urophoria, Urotrichus, Actinobolina, Pelecidia, Discophrya).

2. Fam. Holophryina (Holophrya, Ophryoglena, Spathidium).

3. Fam. Prorodontina (Prorodon, Urotricha, Plagiopyla, Coleps, Lagynus).

4. Fam. Nassulina (Nassula, Chilodon, Opisthodon, Loxodes).

5. Fam. Trichodina (Trichodina, Trichodinopsis).

2nd division.

6. Fam. Leucophryina (Leucophrys, Urocentrum).

7. Fam. Paramecina (Loxophyllum, Cyclidium, Glaucoma, Colpidium, Paramecium, Amphileptus, Loxophyllum, Chilodon, Opisthodon, Nassula, Holophrya, Plagiopyla).

3. Fam. Bursaria (Bursaria, Spirostomum, Condylostoma).

9. Fam. ? (Stentor, Blepharisma, Spirostomum).

10. Fam. ? (Coleps, Prorodon, Holophrya, Trachelius).

Symmetrical Infusoria - (Heteromera).

Perty's system published in 1852 presents no great advance in classification. Stein's system. Perty took the views of the first scientific men not only was not up to date in advance but even in some respects (notably the philosophical structure of Infusoria) remained behind the contemporaneous system, as also was Perty, is distinguished by originality and independence; in this respect, that having removed the Infusoria from the Polygastrica, he introduced for the first time into ... Ciliata, to which he joined, however, besides the ciliated Infusoria, the Tentaculifera and the Suctoria. This first division of Infusoria, i.e. the Ciliata, is divided according to the degree of contractility of the body into 3 groups, a Ciliata, Monadina and Astasiaea consisting of 10 families and 20 genera. Perty's Ciliata are less similar to those of the present system, containing many less, insufficiently and superficially investigated Infusorial genera.

3. The system of Perty.

I Ciliata. SectionII. (Examined with shining ciliae).

a. Cyclotricha.

1. Fam. Vaginicola (Vaginicola, Cothurnia).

2. Fam. Folliculina (Folliculina, Stylonichia, Oxytricha).

3. Fam. Ophryana (Ophryana).

4. Fam. Urocentrina (Stentor, Spirostomum, Bursaria,

[illegible]).

[illegible]

[illegible] (Lomariaceae, [illegible]).

6. Fam. Parkeriaceae (Ceratopteris, Parkeria, Platycerium, [illegible], Polypodium).

7. Fam. Acrostichaceae (Acrostichum, Dictyoxiphium, Elaphoglossum).

8. Fam. Aspleniaceae (Asplenium).

9. Fam. Davalliaceae (Cystodium, Davallia, Humata, Prosaptia, [illegible]).

10. Fam. Dennstaedtiaceae (Dennstaedtia, Microlepia).

11. Fam. Aspidiaceae (Ptychium, Goniopteris, Aspidium).

12. Fam. Polypodiaceae (Acrostichum, Acrostylia, Adiantum, Cyclophorus, Dictyoxiphium, Diplazium, Dryopteris, Gymnogramma, Hemionitis, Leptochilus, Loxogramme, Meniscium, Niphobolus, Nothochlaena, Pellaea, Phymatodes, Platycerium, Pleopeltis, Polypodium, Pteris, Scolopendrium, Vittaria).

13. Fam. Schizaeaceae (Actinostachys, Anemia, Lygodium, Mohria, Schizaea).

14. Fam. Gleicheniaceae (Dicranopteris, Gleichenia, Hemistegia, Mertensia).

15. Fam. Osmundaceae (Todea, Osmunda, Leptopteris, Plenasium).

16. Fam. Marattiaceae (Angiopteris, Kaulfussia, Marattia).

17. Fam. Ophioglossaceae (Botrychium, Ophioglossum).

3. Metaspermae.

18. Fam. Cycadaceae (Encephalartos, Macrozamia).

[illegible] Lebbock [illegible], published in 1858-61, presents a notable [illegible] advance, the author [illegible] from the Linnaean [illegible] of [illegible] the lateral [illegible], [illegible] advanced [illegible] of the [illegible] of the Diptera. His [illegible] the [illegible] of the [illegible] and the physiological [illegible] of the [illegible], the [illegible] did not give special importance to [illegible] which, as Latreille says in the preface to [illegible] of classification presented for them not an aim, but only a means.

Latreille [illegible] [illegible] families [illegible] [illegible] like [illegible] of plots.

a. The system of Latreille and Leach.

1. Fam. Dolichocera (Dolichopus, Psilopus, Hydrophorus, Eutichia, Sciapus, Rhaphium, Syntormon, Tachydromia, Hybos, Empis, Tachydromia).

2. Fam. Brachycera (Brachycera).

3. Fam. Leptidae (Leptis, Atherix, Chrysopila, Leptis, Scenopinus, Vermileo, Rhagio, Tabanus, Acanthomera).

4. Fam. Bombylii (Bombylius).

5. Fam. Asilici (Asilus, Dasypogon, Laphria, Dioctria, Leptogaster, Ommatius, Cyrtopogon, Xylophagus, Stratiomys, Sargus, Beris, Nemotelus, Oxycera, Sarginia, Odontomyia, Clitellaria, Solva, Sargus, Actina, Chiromyza, Pachygaster, Oxycera, Sargus, Stratiomys, Nemotelus, Beris, Odontomyia, Clitellaria, Solva, Sargus, Actina, Chiromyza, Pachygaster, Oxycera).

6. Fam. Tanystoma (Tanystoma, Cyrtus, Microchrysa, Pachygaster, Oxycera, Sargus, Stratiomys, Nemotelus, Beris, Odontomyia, Clitellaria, Solva, Sargus, Actina, Chiromyza, Pachygaster, Oxycera).

...stomum).

7. Fam. Cyrtostomi (Idium, Cyrtostoma, Loxophyllum, Lynchia).

8. Fam. Trachelini (Amphileptus, Trachelius, Trachelophyllum, Chlamydonella, Dactylochlamys, Protoclea, Lacrymaria, Phialina, Prorodon, Urozona, Chilodon, Trichopus, Colpoda, Platyophrya, Nassula, Amphileptus, Loxophyllum).

9. Fam. Holophrya (Coleps).

10. Fam. Haptophrya (Haptoria, Actinobolina).

...ation.

Stein's system appeared in 1859, at about the same time as that of Claparède and Lachmann. Later, in 1867, it was published in a corrected and enlarged form. This system was adopted by the majority of scholars in the field even up to recent times by almost all scholars although it did not present substantial improvements as was the case with the system of Claparède and Lachmann. Like Dujardin - Stein based his classification on the ciliary covering and on the basis of the distribution of the cilia he divided the ciliata into 4 divisions: Holotricha, Heterotricha, Hypotricha, and Peritricha, which he placed on a par with the divisions Flagellata and Suctoria. These divisions, particularly two - Peritricha and Hypotricha - as defined by Stein, are of enough merit so that Stein's families, with few exceptions, present a positive step in systematics entirely natural groups. Stein, occupying himself for almost ten years on Infusoria, described many new forms, so that his system contains 25 families and 107 genera.

3. [illegible] Di Stoma.

I. Div. [illegible].

1. Fam. Cinetochilina (Lembadion, Trachelonema, Plagiopyla, Cyclidium, Trithelum, Pleuronemidium, Cinetochilum, Uronema, Conipylum).

2. Fam. Prorodontina 1) Urocentrida (Urocentrum, Loxophyllum, Colpidium) 2) Prorodontida (Prorodon, Amphileptus, Pleuronema, Colpoda, Trimastoma, Dasytricha, Holophrya, Cyclotrichium, Litonotus, Cyrtostomum).

3. Fam. Enchelina (Trigonomonas, Holophrya, Actinobolus, Prorhina, Perisolena, Trachelius, Coleps, Enchelys, Lacrymaria, Loxophyllum, Dileptus, Trachelocerca, Trachelopterus).

4. Fam. Amphileptina (Chlaeptus, Trachelius, Loxodes, Loxophyllum, Amphileptus).

5. Fam. Spathidina (Holophrya, Urophrya, Dysteria, Spathidium).

II. Div. Heterotricha.

1. Fam. Bursellina (Condylostoma, Blepharisma, Bursella, Climacostomum,

7. Fam. Stentorina (Stentor, Fabrea).

8. Fam. Balantidina (Balantidium, Opalinopsis, Nyctotherus, Metopus, Plagiotoma).

III. Div. Hypotricha.

6. Fam. Oxytrichina (Pelliotricha, Oxytricha, Stylonychia, Onychodromus, Pleurotricha, Aspidisca, Dicepta).

...

...stichotrichida, ...ecina, ...plotrichida, ...richida).

16. Fam. ...richotrichida (...richotricha, ...richotricha, ...richotricha).

17. Fam. ...richida (...richida).

18. Fam. ...richida (...richida, ...richida, ...richida, ...richida).

19. Fam. ...richida (...richida, ...richida, ...richida, ...richida, ...richida, ...richida).

20. Fam. ...richida (...richida).

21. Suc. ...richina.

22. Fam. ...richida (...richida, ...richida).

23. Fam. ...richida (...richida).

24. Fam. ...richida (...richida, ...richida, ...richida, ...richida).

25. Fam. ...richida (...richida, ...richida, ...richida, ...richida, ...richida, ...richida, ...richida, ...richida).

26. Fam. ...richida (...richida, ...richida, ...richida).

27. Fam. ...richida (...richida).

28. Fam. ...richida (...richida).

29. Fam. ...richida (...richida, ...richida, ...richida).

30. Fam. ...richida (...richida, ...richida).

Stein's system was published in 1859, at approximately the same time as that of Stein. Recognizing the defects of Stein's system, Engelmann correctly has called attention, namely, the dividing of the ciliates [illegible] into four groups, Stein dividing all the ciliata (or Infusoria, as he called them) into the Aperistomata, those without peristomes, and Peristomata, or those with peristomes. Each of these groups Stein

[illegible] that [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [

[illegible], Lecythis, Bertholletia, Couratari, Eschweilera, Gustavia, Couroupita, Lecythis, Grias, Allantoma, Cariniana, Bertholletia).

2. Fam. Myrtaceae (Myrtus, Eugenia, Calyptranthes, Myrciaria, Psidium, Jambosa, Myrcia, Pimenta, Eucalyptus).

3. Fam. Melastomaceae (Melastoma, Tibouchina, Rhynchanthera, Bertolonia, Miconia, Clidemia, Heterocentron, Tococa, Centradenia).

Unter'n System (Nr. 1 - 3) ressortiert [illegible] Familie [illegible] Gattungen [illegible] Arten [illegible] Familien [illegible] Gattungen [illegible] Arten [illegible] Familien.

7. Das System von Rost.

1. Caliciales.

1. Fam. Pleurocolleae (Pleurocollema, Leucocytidia, Placus, Coniocybe).

2. Fam. Pyrenocollaceae (Pyrenocollema, Lecidea, Cyrtostoma, Isothecium, Heppia, Stostoma, Heterostoma).

3. Fam. Lecideaceae (Lecidea, Biatorella, Bacidia).

4. Fam. Coliciaceae (Coliciopsis, Phaeocalicium, Polyblastia).

5. Fam. Caliciaceae (Calicium, Stenocybe, Acolium, Coniocybe).

6. Fam. Sphaeromphaleae (Sphaeromphale, Lecanactis, Opegrapha, Graphis, Chiodecton).

7. Fam. Trachelidae (Trachelius, Amphileptus, Lacrymaria).

8. Fam. Dysteriidae (Dysteria).

9. Fam. Holophryidae (Holophrya, Prorodon, Spathidium, Trithigmostoma, Coleps, Plagiopyla, Acinetoides, Chlamydodon, Pleuronema, Cyclidium, Glaucoma, Paramecium).

10. Fam. Pleuronemidae (Pleuronema, Cyclidium, Glaucoma, Paramecidium).

11. Fam. Loxodidae (Loxodes, Trachelocerca).

12. Fam. Urocentridae (Urocentrum, Cyrtostomum, Dinomyrmia).

13. Fam. Spirochonidae (Spirochona, Anophryoxya, Haptophrya, Acinetopsis).

II. Heterotricha.

14. Fam. Bursariidae (Bursaria, Balantidium, Nyctotherus, Metopus, Metopides, Plagiotoma).

15. Fam. Spirostomidae (Condylostoma, Diophrys, Spirostomum, Leucophrys).

16 Fam. Stentoridae (Stentor, Folliculina, Chaetospira).

17. Fam. Tintinnidae (Tintinnus, Tintinnidium, Vasicola, Strombidinopsis).

18. Fam. Strombidinopsidae (Strombidinopsis).

19. Fam. Coleodictyidae (Coleodictya, Tintinnopsis).

20. Fam. Calyptotrichidae (Calyptotricha).

III. Peritricha.

21. Fam. Ophrydiidae (Ophrydium).

22. Fam. Dictyocystidae (Dictyocysta, Petalotricha).

23. Fam. Actinobolidae (Actinobolus).

24. Fam. [illegible] ([illegible]).

25. Fam. [illegible] ([illegible]).

26. Fam. Dicoelidiidae (Trichotima, Dicoelia, [illegible]).

27. Fam. [illegible] ([illegible]).

28. Fam. Peritrichidae (Ceria, [illegible], Trichotricha, Stylotricha, Histriculus, Pleurotricha, Oxytricha, Kerona, Urostyla, Holosticha, Gastrostyla, Uroleptus, Keronopsis, Onychodromus, Amphisia, Horostichа, Plagiotricha, Epiclintes, Stichomonas, Stichotricha, Sonderia, Strongylidium, Histrio, Diophrys, Stylonethes, Aspidisca, Pleurotricha, Gastrostyla, Oxytricha, Euplotes, Stylonychia).

29. Fam. Euplotidae (Aspidisca, Uronychia, Euplotes, Stylonychia).

III. [illegible].

30. Fam. Litonotidae (Litonotus).

31. Fam. Chlamydodontidae (Chlamydodon, Chilodon, Nassula, Opisthodon, Chlamydonella, Scaphidiodon).

32. Fam. Dysteriidae (Lacrymaria, Dysteria, Cyclidium, Megalia, Plagiotoma, Lagynus, Trachelius).

33. Fam. Pleuronematidae (Pleuronema).

34. Fam. Paramaecidae (Paramaecium, Colpidium, Glaucoma).

At last, in 1888 Bütschli published his System of Protozoa in his original work on Protozoa(13). Following, like Diesing the division of Stein's Grossclassification, Bütschli sharply and definitely limited the classes of Protozoa, dividing the into two groups: Ciliata and Sactaria. The subclass Ciliata Bütschli divides according to the arrangement of cilia and distinguishes two orders: Gymnostomata and Trichostomata. The kind of such a division was already used by Claparède and Lachmann(15: p. 71-75), but not held used in their system. The order Trichostomata Bütschli subdivided on the basis of the presence or absence of special lines of ciliary structure subdivisions into two suborders: Aspirotricha and Spirotricha.

The first suborder he divides further into 4 groups: Heterotricha, Oligotricha, Hypotricha, and Peritricha. These groups correspond in a certain degree to the orders of Stein, in that the order Heterotricha of Stein corresponds with a few corrections the order Gymnostomata + the suborder Aspirotricha of Bütschli's order Trichostomata. All the Ciliata Bütschli divides into 25 families containing 142 genera. Bütschli's families he unites intensive groups, some of which he subdivides still further into subfamilies.

Bütschli's System surpasses any the systems that are described: 1) in his having as a basis of classification not a single characteristic but a group of characteristics 2) his orders are more less present entirely natural groups and 3) his system avoids polyphyly.

c. Fam. [illegible] Catenulidae.

II. Gymnostomata.

a. Fam. Proseli[illegible].

1. Subfam. Haplopharyngina (Haplopharynx, Proboscina, Monotus, Catenula, Stenostomum, Proboscina, Dinophilus, Macrostomum, Haplopharynx, Haplopharynx, Haplopharynx).

2. Subfam. Rhabdocoelina (Rhabdocoelum, Plagiostomum).

3. Subfam. Dalyellina (Plagiostomum, Graffilla, Graffilla, Stenostomum).

4. Subfam. Cylindrostomina (Dinophilus, Mesostomum).

5. Subfam. Prorhynchina (Prorhynchus).

b. Fam. Microstomidae.

1. Subfam. Microstominae (Microstomum, Microstomum, Microstomum, Microstomum).

2. Subfam. Alaurininae (Alaurina).

c. Fam. Polycladidae.

1. Subfam. Acotylea (Leptoplana, Discocelis, Leptoplana, Stylochus, Planocera).

2. Subfam. Cotylea (Leptoplana).

d. Fam. Temnocephalidae.

1. Subfam. Temnocephalinae (Temnocephala).

2. Subfam. Microdalyellinae (Microdalyella, Microdalyella, Microdalyella, Microdalyella, Microdalyella, Microdalyella).

3. Subfam. Bdellouridinae (Bdellouria, Bdellouria, Bdellouria, Bdellouria).

III. Rhabditophora.

1) Rhabdocoela.

a. Fam. Graffillidae (Graffilla, Graffilla, Graffilla, Graffilla, Graffilla,

[illegible], Colpidium, Plagiopyla, Nyctotherus,
Metopus, Loxodes, Trachelius, Trachelocerca,
Coleps).

6. Fam. Dysteriina (Dysteria, Plagiotoma, Prorodon,
Lacrymaria, Coleps).

5. Fam. Paramecina (Paramecium).

7. Fam. Urocentrina (Urocentrum).

8. Fam. Cyrtostomina (Cyrtostoma, Cyclidium, Glaucoma,
Chilodon, Leucophrys, Ophryoglena).

9. Fam. Ophryoscolina (Ophryoscolex, Diplodinium,
Cycloposthium, Polyplastron, Ophryodendron).

10. Fam. Opalinina (Opalina, Anoplophrya, Nolilophrya, Bursaria, Balantidium, Opalinopsis, Opalina).

2) Spirotricha.

1. Heterotricha.

11. Fam. Plagiotomina (Conthophthirius, Plagiotoma, Nyctotherus, Blepharisma, Metopus, Loxodes).

12. Fam. Bursaria (Balantidium, Balantidiopsis, Conchibotoma, Bursaria).

13. Fam. Stentorina (Climacostomum, Stentor, Folliculina).

14. Fam. Spirochonina (Spirochona).

2. Oligotricha.

15. Fam. Licnophorina.

16. Fam. Halteria (Strombidium, Halteria).

1r. Fam. Xantiosia (illegible, Xantiosa, Xantiomyia, Xan-

thosia, Xenojosia).

1c. Fam. Cyclocrinidi (Cyclocrina, Dictyocrina, Cyclocoelia,

Cyclus).

3. Apostrica.

1b. Fam. Peritrocina (Peritrocus).

2b. Fam. Lagynosia.

1. Subfam. Diostylina (Diplostylus, Diostylis, Xeliosa, Api-

olinites, Stichostylus, Stomyxi-

dium, Xolostylus, Amphisia, Diolostylus,

Apostylosa).

2. Subfam. Plectrotrichina (Onychotrochus, Plectrotricha, Cas-

tanostylis, Cymbalomma, Discosoma, Cy-

trichia, Stylonychia, Distichostich-

stricha).

3. Subfam. Folliculinina (Folliculina, Porpotricha).

1. Fam. Ancistrina (Ancistrum, Coriscia, Megalys, Dendrocha).

2. Fam. Lagynochlamina (Lagynochlamys).

3. Fam. Vorticellina.

2. Peritricha.

1b. Fam. Urceolariina (Urceolaria).

2b. Fam. Lichnotrichina (Lichnotricha).

3. Fam. Vorticellina.

1. Subfam. Prosolenina (Trimastina, Cyclocystis, Trimastinopsis).

2. Subfam. Vorticellinina (Lagynidia, Acineta, Astylozoon, Vorticella, Carchesium, Scothamnium, Glossatella, Epistylis, Ophrydiopsis, Opercularia, Cyclidium, Cothurnia, Cothurnidiopsis, Vaginicola).

3. Subfam. Lagenophryina (Lagenophrys).

2. Classification.

The system published in this monograph closely resembles Butschli's system although it differs from it as to arrangement of orders and groups, and also as to the composition of families. Not desiring to introduce new names for the arrangements of groups, with which even without this zoological literature abounds, I followed the names published by Butschli, though I think proper to observe, that many of my groups do not correspond to Butschli's groups bearing the same names.

Coupling together with Stein and Butschli the mistakes of Stein's system, I nevertheless admit the arrangement of orders and even holotrichous and heterotrichous as very natural groups, although in the first of these two I made some corrections. Butschli in his system divided Stein's order holotricha into 2 separate groups gymnostomata and trichostomata aspirotricha, joining to the latter the rest of Stein's orders in the large order trichostomata, posed to the order gymnostomata. Such a splitting of the small natural group holotricha appears to me

[illegible] Stein's [illegible] Infusorien [illegible] Stein's Infusorien [illegible] Stein's Infusorien [illegible] Stein's

The first Lophotrochs I subdivide on the basis of the alimentary canal of mouth and trochophore, in which I have series up on (p. 37-38) into 3 suborders: Gymnostomata, Trichostomata and Entomata, dividing the first suborder into 3 groups: Prostomata, Pleurostomata and Hypostomata. The other Lophotrochs I divide into 18 families, consisting of 30 genera and 18 forms.

The distribution of genera into families, groups and suborders and their genetic connection appear without great obscurity from the annexed genetic tree.

Table for the determination of the families of Aspirotricha.

Aspirotricha.

1. Mouth present, at least early when young. 2.

2. Mouthline ~~covered~~ closed. In large part; its cilia not surrounded by specialized cilia. Oesophagus (if there is one) naked or in many forms surrounded by a fin apparatus. Suborder Gymnostomata.

3. Mouth at anterior end (at pole) of body. Prostomata.

4. Entire body equally covered with cilia.

5. Without antemarginal processes. .....I. Holophryina

5. One (~~or several~~ at anterior end) or several (at center or the tuft of cilia) antemarginal processes .....II. Hetinotrichina

4. At anterior end one or several rather long coronal cilia.

5. Body covered with specialized armour; around mouth coronal cilia or highly refractive structures.

III. Colpina.

5. Body without armour.

6. At anterior part of body 1 or 2 coronal cilia or tuft of long cilia...IV. Cyclotrichina.

6. All anterior end uniformly covered with long cilia; parasitic...V. Pleurotrichina.

3. Mouth lateral on the side, or formed by the ventral surface. Pleurostomata.

4. Body flatted dorsally; mouth sublinear occupies anterior part (cilia) of ventral edge...il. Amphilinina.

4. Mouth rounded; oesophagus surrounded with ten appiratus.

5. Mouth at base of proboscis or neck; from ventral margin of proboscis is a row of oral cilia.

VII. Trachelina.

5. Mouth at anterior part of body on ventral side; no proboscis. ....VIII. Dasyulina.

3. Mouth on ventral surface; only ventral surface covered with cilia. Hypostomata.

4. Body flattened in dorso- ventral plane; cilia cover either all the ventral surface or are arranged on it in several rows; without thornlike processes...I. Chlamydodonta

4. Cilia cover in the majority of cases only part of the ventral surface; At posterior end plasmatic thornlike processes or structure.

5. Without arrangement of cilia....a. Dysteina.

5. The arrangement of cilia ~~on anterior end of body~~, Summed in the oesophagus extends from anterior end of body to mouthline opening ventral. Onychodactylina

2. Peristome opening at the side; from its external edge either a row of cilia or one of the ~~wavy~~ undulating membranes. Oesophagus (if present) covered with cilia or along its wall 1-2 rows of cilia or a ~~wavy~~ undulating membrane. Subclass Trichostomata.

3. Mouth opening in anterior part of body; it is posterior, at the bottom of the peristome.

4. Peristome not present; along the external margin of the mouth is attached a row of cilia or 1-2 ~~wavy~~ undulating membranes. Oesophagus not present or but; in oesophagus cilia or ~~wavy~~ undulating membranes....III. Chilifera.

4. Peristome more or less ancoriform.

5. Peristome forms a small hollow at posterior part of body, lying nearer the left or right edge of the body; at anterior end peristome has a mouthline opening. Body flattened in a dorso-ventral plane.....III. Heterotrichina.

5. Peristome arranged on longitudinal axis of the body.

6. Peristome in shape of a channelline cavity covered with cilia or names not covered by wavy ~~torsatory~~ undulating membranes.

7. All the body equally covered with cilia: peristome occupies anterior third(or two-thirds), of ventral surface; covered with cilia....IV. Paramaecina.

7. Cilia arranged in three parallel ~~rows~~ girdles; the channelline peristome extends from posterior end to middle of body, naked, on its right edge is attached row of cilia.

...ni it t... ...st:ri... ... a tuft o... cilia.

XV. Trocentrina.

O.Peritome entirely, not covered with cilia,occu...
...ies a ...nsiderable part of ventral surface;
its external margin is attached ...undulating
...ire membrane having the shape of a ball or a
prismatic ...g. Cilia usually ...ristic...shape.

XVI. Piedmontina.

O. Peristome straight in middle of body on ventral sid...
entirely perpendicular to the longitudinal axis of
the body, tolerably covered with cilia (characteris-
tic arrangement).Oesophagus entirely covered with
cilia.... .....XVII. Plagiopylina.

O. Mouthless opening at posterior end of body; entoparasitic.

XVIII. Isotrichina.

1. No mouth. Parasitic forms. Suborder Astomata.....XIX. Opalinina.

I. Subfam. Cyrtostomata.

A. Plostomata.

1. Family. Holophryidae Perty.

To this family Holophryina is located those all the simply organized and equally ciliated Holotricha. Small bodies present in a majority of cases ~~body of rotation~~ ovoidal forms having a spherical, ellipsoidal or cylindrical form. At times on account of retractility they are ~~sparsely~~ evenly nodular, at times ~~constant~~ filiform and leaflet or tentacle. In some forms (Lagynus Lacrymaria, Trachelocerca, Chaenia) the anterior end is drawn out into a long or shorter neck, which in Lacrymaria is provided with a special cervical articulation, the so called head. Only a few forms do not have cyrtostomy ~~body of rotation~~ forms, these whose anterior end, obliquely cut appears more or less flattened at the sides (Spathidium, Chaenotheridium) or whose whole body is strongly flattened (Trachelophyllum) and thus appears shield-shape. The body of all Holophryina (with the exception of the genus Prostilina) is equally covered with cilia, placed in the majority of cases in shallow furrows. These furrows extend in the majority of cases, meridionally or spirally (Holophrya ovum, Lacrymaria, Peridplia and Chaenia) from the anterior to the posterior part of the body. The meridionally arranged cilia ~~of~~ distinguish more late towards the posterior end which in this genera (with the exception of U. lagenula) is even quite late of them, but instead there are fastened to it 1-5 sensory bristles. In a few genera (Spathidium, Lagynus, Trachelophyllum, Lacrymaria Trachelocerca and Chaenia) whose bodies are covered with cilia, at the anterior end, about the mouthless opening there is one (in the first two genera) or several (in the remaining four genera) collomas of rather long and thick cilia. In Prostomatella and Chaenia there occur also tufts of rather long cilia at the posterior end of the body. The entoplasm appears either in the shape of a ~~thin~~ homogeneous layer or consists of an alveolar layer and

and a very [illegible] external position. Trichocysts occur only in a few forms (Holophrya discolor, Spathidium spathula, Prorodon arcuatus and Chaenia elongata).

The characteristic of the family Holophryina is the position and form of the mouth. A cytostome groove is found generally at the anterior end of the body, in a majority of cases at the polar aperture or (in Prorodon, Lacrymaria and Chaenia) immediately next it. The mouthline opening is usually elliptical and is visible only at the time of taking food, when it very considerably widens. In Holophrya simplex, Enchelys, Spathidium and Lacrymaria olor it leads into the body directly, into the entoplasm, whilst other genera it leads into the neck or first zone, instead of continuing as such into the body as in either case or surrounded by cilia, sometimes (Prorodon, Coleps) in a specialised oesophageal apparatus.

Not less characteristic of Holophrya is the position of anus and contractile vacuoles, lying (if there is a vacuole) at the aboral pole of the body, i. e. diametrically opposite the mouthline opening. Almost all Holophrya have one contractile vacuole, and only Lacrymaria olor has two, Enchelys usually from four to five, and Holophrya multifiliis, Prorodon margaritifer and Chaenia classes several contractile vacuoles.

The macronucleus in almost all Holophrya is single; it lies in the middle or in the posterior half of the body and is spherical, ellipsoidal, reniform or otherwise cylindrical. The micronucleus is far from being found in all forms. In Prorodon margaritifer, Trachelophyllum apiculatum and Lacrymaria olor the macronucleus consists of two bodies, while Holophrya oblonga, Chaenia teres, elongata and classes have several.

The food of Holophrya—typical raptorial forms, consists of algae and small Protozoa. Division takes place in the free swimming and encyst-

in conjugation. At the time of conjugation individuals are joined by the mouthing openings.

The family Holophryidae was established by Fetty in 1933. He refers the representatives of Holophryina to different families: Enchelidae, Trachelidae and Dysteriidae in the family Enchelina, while Maupasia refers them to Enchelyina, Trachelocerina and Lacrymariina.

Kahl and Lauterborn unite the to the present Amphileptina, Trachelidae, Dysteriidae and Lacrymariidae in one family Holophryina, although he also refers to this Colpina and Actinobolina. Kent divided Stein's naturel family into 5 different families: Prorodontidae, Trachelophyllidae, Enchelyidae, Trachelocercidae and Ichthyophthiriidae, adding forms which are totally in common with them. At last Butschli rejected Fetty's Holophryina, and regards them as the subfamily Enchelina. Our family Holophryina comes nearest of all to Butschli's, with this difference, it contains two genera Enchelotrichum(new), while the genera Dimorpha I refer to the family Spirotrichina.

The family Holophryina consists of 12 genera.

Table for the identification of the genera of Holophryina.

1. Mouth at the anterior pole or occupying all the anterior extremity of the body.

2. An specialized (large) cilia about the mouth.

3. Anterior end of the body equally rounded or narrowed to a neck, but not trattened.

4. Body spherical, ellipsoidal, mouth at anterior pole, Oesophagus short.

5. All the body equally covered with cilia, no tactile

1. Holophrya.

3. Cilia at posterior end or body like rest of posterior end without cilia. 1-3 bristles at posterior end of body ..... 2. Urotricha.

4. Body vermiform, narrowed at anterior; anterior end cut straight or obliquely and entirely occupied by mouthline opening, no oesophagus. .... 5. Chonotrys.

3. Anterior end of body flattened from the two sides and obliquely cut

4. Mouth occupies the anterior extremity of body; no oesophagus. ... 4. Spathidium.

4. Mouth at anterior angle of anterior extremity of body, oesophagus tubular, surrounded by rods....6. Chaetospiridium

2. Mouth mostly at anterior end of body 1 or several coronas of large cilia.

3. Anterior end of body without special processes; 1 oral corona of long cilia.

4. Body vermiform: mouth round end, oesophagus tubular or funnel-formed. .... 8. Lagynus.

4. Body strongly flattened, lanceolate; mouth slitline : oesophagus strongly flattened.. .7. Trachelophyllum.

3. Process like a conical head at anterior end of body or 1-3 tubercles; 2 or several coronas of large cilia.

4. Body often cylindrical with conical processes (heads) at anterior end; several coronas of cilia...9. Lacrymaria.

4. Body cylindrical, vermiform, with 4-5 nipples at anterior end and 2 oral coronas.8. Trachelocerca

1. Mouth at anterior end of body near anterior pole.

2. Body ellipsoidal or cylindrical, mouth near anterior pole at side; oesophagus tubular.

3. Ciliary furrows extend meridionally; no longitudinal channel

10. Prorodon.

Ciliary furrows extend spirally, lengthwise of body a spiral channel..... 11. Perispira.

2. Body oblong- cylindrical, tapering anteriorly, mouth slitlike at anterior end, at side; no oesophagus.... 12. Chaenia.

1. Coleps hirtus.

~~Monilicaligat-us Coleps hirtus Ehrenberg, Pl. VII. fig. 178 and 186.~~

Pl. I. fig. 1-4, Pl. VI. fig. 166-167, Pl. VII. fig. 178 and 186.

The shape of the body is spherical, ellipsoidal, conical, or oblong-cylindrical, rounded at both ends; in the last two cases the anterior part of the body always wider than the posterior and somewhat blunt, while the posterior end is usually narrower and rounded. The shape of the body varies not only in different species, but even in different individuals of one and the same species, depending very often on the amount of food taken in. The entire body is equally covered with rather long, fine and supple cilia.

The cilia are on small papillae (knobs) in smaller furrows, alternating meridionally, zigzagally (Ehrenberg) from the anterior to the posterior pole of the body, where they meet at one point. The spaces between the furrows appear as small elevations or so called ribbed bands. The number of the ciliary furrows for each species is more or less constant, as for example, C. simplex (Pl. I. fig. 1) has 18-20, C. hirtus. discolor (Pl. I. fig. 2) usually 32 furrows.

In the last species at the anterior end of the body the cilia are somewhat smaller and more closely arranged than in the other parts, forming at this place an elliptical field, in the midst of which is found the mouthline opening.

under the ciliary rootes lie in some species specialized contractile elements of the so-called myonemes (Pl. VI. fig. 156-157), depending on the position of the individual body. The myonemes appear in the form of fine rather highly refractive bristles or fibrils, enclosed in a thin longitudinal sheath, full of liquid. These sheaths lie in an alveolar layer of ectoplasm immediately under the longitudinal ciliary furrows.

The ectoplasm consists of an extremely thin, external pellicle and a rather thin alveolar layer. In some species in addition to the alveolar layer is found also a brilliant almost homogeneous layer of protoplasm, the so-called cortical prism, in which lie numerous trichocysts. The entoplasm is also rather thin consists of many highly refractive granules. In A. obtusa (Pl. I. fig. 3) these granules occur in masses, forming entire secretions, appearing as highly opaque spots. Besides this in the same species at the anterior end of the body occurs also a yellow or brownish colour, consisting of small pigmented (yellow) granules.

The mouth opening is always found at the anterior end of the body. It is either round or in the form of a longitudinal slit. In A. simplex it is a distinct difference from this that it is only visible at the time of dividing, while in other species it is always visible. Around the mouth in some species there are a few cirrhi of small, always thick set cilia, appearing like cortical lips over the mouth opening.

The oesophagus does not occur in all species and appears in the shape of a small, delicate or conical tubular or even like a thick walled oesophagus tube which gradually at the anterior end and then narrowed at once. In the first case the wall of the oesophagus is surrounded with fine, spiral fibrils, which do not united in a specialized oesophageal apparatus.

At the posterior pole of the body, i.e. diametrically opposite the

[illegible] is found the nuclei [illegible] in the majority of species is visible only at the moment of *deciduation*.

Near the anus lies generally one contractile vacuole, discharging its contents into a small canal which passes into the alveolar layer of the endoplasm and opens to the outside by means of a fine excretory canal. This excretory canal, like the vacuole, can be seen only in large species. In *N. discolor* the observed 4 rays leading from the contractile vacuole, which at times are confluent with a long canal. Only one species *N. multifiliatus* (i. Fig.4) has several contractile vacuoles, arranged without definite order through the whole surface of the body and contracting at different times.

The nucleus in the majority of species is in the form of a single spherical or ellipsoidal macronucleus but in some it is also a spherical or ellipsoidal synkaryonic. The macronucleus has generally a reticular or alveolar structure and a fine membrane. In some forms there may be seen in it a specialized spherical inclusion, consisting of a central chromatin mass, from which fine threads radially towards the surface. The synkaryonic is either a homogeneous, highly refractive body or it consists of 1) a longitudinal striped- chromatin section and 2) a colorless structureless section. In *N. chromatophorus* (i. Fig.5) occur several macronuclei or one vermiform nucleus.

The genus *Nolophaga* is found in marine and fresh-water species, but especially in the latter. It prefers pure water and some usually on the surface of the algae. It is not found in putrid waters. The movements of *Nolophaga* are regular, rather rapid and equally maintained, accompanied generally by rotation about the longitudinal axis of the body. *N. multifiliis* is parasitic on the external covering in some species. It is seen by the thousands, forming on the scales of the fish small, gelatinous,

million cysts per cubic, visible even with the naked eye. The body is always contractile plant, and for that reason it takes varied shapes. Color is extremely variable and many in different species but even in different individuals and at times depends on the food received.

Food consists of one or many other algae, starch grains, and even drops of fat. With especial readiness they feed on fat, finding it in the bodies of microscopic crustaceans. The Noctiluca are very gracious and it happens on this account sometimes that the shape of the body changes during digestion. At the time of taking food the mouth opening and oesophagus are said to widen very remarkably.

Multiplication takes place in the free swimming condition and consists of transverse division. Only in N. multifiliis are cysts formed at the time of multiplication, at which time the contents of the cysts by [illegible] divisions of the protoplasm and the nucleus fall into numerous small individuals, escaping at the rupture of the cysts. Other species form only resting cysts, having formed of oval forms are covered with a fine of gelatinous membrane. At the time of conjugation individuals lie close at first by the mouth openings but at last by their anterior ends; at the point of contact the entoplasm opens, so that a mutual exchange of the products of myriad-like division takes place and not exclusively by the mouth openings.

Species are distinguished as:

1. One contractile vacuole at the posterior end of the body.

2. Ciliary rudiments arranged meridionally.

3. No oesophagus; body ciliated...d. simple.

5. oesophagus tubular.

4. oesophagus ribbon like.

5. body ellipsoidal, trichocysts, nucleus oval.

6. Nucleus.

[illegible] [illegible] [illegible] [

[illegible] mouth at [illegible] 33 and 34. Mouth opening at anterior end of body, surrounded by small cilia, forming in their position something like lips. Oesophagus small. Anus and contractile vesicle at posterior end of body. Nuclear system.

Hab. From ratels of Europe and Asia (Ancylostoma, Dermatin).

3. Agriopoda discolor Dies.

Linstow 84; p. 201 and 00; p. 514. Pl. XXXII. fig. 8 Dujardin 57; p. 000 Diesing 00; p. 11 and 257. Leuckart 104; p. 140. Pl. IV fig. 2. Stein 214 p. 6-7, 103 and 104 and 218; p. 00. Stiles and Lachmann 00; p. 514. Wedl 100; p. 257. Hunt 134; p. 100. Railliet 25; p. 1070-78. Pl. LVI. fig. 6 and 7. Schneider 157; p. 10-15. Pl. I. fig. 5-8; 100; p. 61.

Syn. Agriopoda Hasselli. Moreschowski 105; p. 257-8 Pl. II. fig. 8 and 9a. 100; p. 171-2, Pl. X fig. 29- 30.

Agriopoda polyphyes. Schmarda 201; p. 21 Pl. VII. fig. 5.

Ancylostoma discolor. Diesing 00; p. 22-23.

Trichosoma morrisii. C. F. M. Lee. 173; p. 100. Pl. XXIV fig. 5.

Proroleon sulcatus. Maskell 152; p. 53. Pl. III fig. 4

Pl. I. fig. 2. Pl. VI fig. 153-157. Pl. VII. fig. 170 and 180.

Medium-sized worm from 0,050-0,15mm long and 0,00-0,00mm broad.

Body cylindrical, slightly tapering, sometimes strongylose and even spindle-shaped, tapering at the anterior end narrower at the posterior end. Cilia are placed in longitudinal medial and lateral rows; around the mouth are arranged radially small thickly set cilia. Mouth opening slitlike, at anterior end of the body, leads into the tubular, thick walled oesophagus, surrounded by nine rods. Anus and contractile vesicle at posterior end of body. 4 cervical papillae and 1 stipitated papillae.

Hab. Fleas of cats, dogs, Europe, Australia and New Zealand, and also the rat (Mus [illegible]).

4. [illegible] flavicans Leuckart.

Leuckart 1849; p. 326- 327.

Large rolls from 0,11-0,15mm. long and 0,1-0,15 broad.

Body ellipsoidal or almost spherical, at anterior end flat or blunt. Cilia arranged in longitudinal rows. Mouth opening on anterior pole; oesophagus tubular, provided with a longitudinally elliptical lumen. Anus and contractile vacuole at posterior end of body. Hermaphrodites ellipsoidal with spermatheca behind it.

Hab. Fresh waters of Europe.

6. Holophrya discolor Ehrb.

Ehrbg. 1838; p. 127- 130. Pl. XXI fig. 1-2.

Syn.: Prorodon marinus Claparède and Lachmann 58; p. 522, Pl. XVIII fig. 2.

Prorodon marinus Maskentosdt 100; p. 17-18, Pl. I fig. 10.

" Moebius 70; p. 98-100, Pl. X fig. 1-3.

Holophrya maxima. Daday 02; p. 407-409. Pl. XV fig. 3.

Pl. 1 fig. 5.

Body large form from 0,3-0,4mm long and 0,020-0,03mm broad. (according to Daday it reaches 0,8mm in length.)

Body long, cylindrical, rounded. At the anterior and the somewhat narrowed at the posterior. Cilia arranged in meridional furrows. Mouth opening at anterior end of body; oesophagus conical, tubular. At anterior end of body a perior spot. In entoplasm some accumulation of small granules and also of crystalline granules (excretory granules). Large contractile vacuole at the posterior end of the body. Nucleus single, rosary (Daday) or several nuclei (Maupas). (according to Moebius nucleus ellipsoidal).

Hab. Mediterranean Sea (shores of Africa and Italy), Atlantic Ocean (shores of Norway) and Baltic Sea (shores of Sweden).

b. Actinosphaerium multifilum Kent, sp.

Cat. Mic. Inf., p. 1078, fig. 1161 A, B.

Synon.: Ichthyophthirius multifiliis. Fouquet 98; p. 100-103, Pl. V Fig. 1-11.

Ichthyophthirius multifiliis. Kent 101; p. 350-351, Pl. XXIII Fig. 1-5.

Ichthyophthirius multifiliis. Stiles 267; p. 173-174.

Ichthyophthirius cryptostomus. Schilling 294; p. 25-28.-299; p. 230-232.

Multifiliasis I. Protozoa. Diagnosis and Additional data; p. 33-35.

Chromatophagus parasiticus. Korbi 1900; p. 44-50.

Pl. I Fig. 4.

Very large form 1.5mm-3.0-5.0mm in diameter. Body almost spherical, thick, may covers with short ciliated cells irregularly. Mouth opening at anterior end; oesophagus short, cylindrical. Endoplasm many fine, highly refractile granules (excretory granules). Several contractile vacuoles, scattered through all the body. Nucleus ranging in size from small to large. Myxobacteria seen only in young forms. Cysts fall to the bottom and their covers fall by means of transverse fission into an indefinite number of young individuals. The young are ciliform, with one contractile vacuole and 1 macro- and myxobacteria. They live parasitically on the skin, fins and gills of some fresh water fish (Salmonidae and Cyprinoidae)

Hab. Fresh waters of Europe.

2. Urotricha Cl and L.

Cl. I pl. 3-6, Pl. VII fig. 175.

The body of the body is spherical, ellipsoidal or pyriform, equally rounded at both ends or narrowed at the anterior end. Body covered with fat of long, fine cilia.

Cilia are on small papillae (knobs) arranged in longitudinal rows which cross meridional stripes on the integument. In large forms it is possible to see, that the meridional rows of these somewhat projecting papillae are in spiral rows. It is very probable that in other species also the cilia are arranged, but, in consequence of the extremely small size of the individuals (0,04 mm. long) they are difficult to distinguish. The cilia do not reach close to the posterior end of the body, but leave a small place, free from cilia and therefore free from meridional stripes. Only in one (or. marginata) the whole body covered with cilia, which however as they approach the posterior end become finer. At the posterior end of the body is found from 1-4 long, more or less hair bristles, serving for touch as well as for changing the direction of motion. The bristles are in small cavities and fastened in the direction of the longitudinal axis of the body, or at the side ~~over the cavity in~~ at an angle to it.

The entoplasm consists of a fine ectoplasmic peripheric and a rather fine alveolar layer. In some forms with the alveolar layer is observed, as it seems, a homogeneous, structureless layer of entoplasm. The entoplasm is more or less filled with small, highly refractive granules.

The mouth opening is round, at the anterior end of body. It is surrounded by one or several crowns of small and thin lyssi cilia, appearing as they were on other somewhat like lips, extending over the mouth opening.

The mouth opening leads into the more or less long, tubular oesoph-

[illegible] mass consists of a fine layer of cytoplasm. The [illegible] nucleus and cytoplasm consist of minute-granules. In some species the nuclei of the body are distributed [illegible] these often in the cytoplasm, within the body and some nucleus.

At the [illegible] end of the body, diametrically opposite the mouth opening, is found the anus, which can be seen only at the time of defecation.

Not far from the anus is [illegible] the contractile vacuole. The position of the contractile vacuole [illegible], it [illegible] on the place of attachment of the tactile bristles, e.g. in the majority of species (Pl. I fig. 3-5) it lies at the dorsal end of the body, while in one (in which the tactile attachment is at the side Pl. I fig. 5) it lies somewhat to one side, either it is at the posterior end. The entrance opening of the contractile vacuole may be seen only at the time of systole and then it is large. At the middle of the body or somewhat beside the posterior end is found the comparatively large macronucleus. In living individuals it appears generally homogeneous and rather highly refractive, while in fixed specimens there appears with considerable fine granulations and pinkish or fine alveolar structure. Near the macronucleus lies the small, usually ellipsoidal or [illegible] micronucleus. In young individuals it appears, it seems, homogeneous, although in the species there may be seen in longitudinal stripes.

The genus Strotrica occurs in fresh water [illegible] and slime among algae and plants [illegible] in decaying matter. It is found singly or in large numbers. Division is rather rapid, progressive (the tactile end of the body always takes the lead) and is accompanied by rotation about the longitudinal axis of the body. When swimming Strotrica describes generally a line or circle or constantly changes its direction by the help of the

so called cactus bristle, arising from its basal peduncle consisting of the cactin as a basis. The body of Strobilidium consists of one cell. Myxo. Strobilidium is always reflexed, so that its body is always filled with nutritive matter. The peristomium is apt to be very strongly ciliated, so that Strobilidium is in a condition to swallow prey whose diameter is ten times larger than the mouth opening.

4 species are known, occurring in fresh water.

1. Shape of body piriform, peristomium conical, circumscribed, ciliated.

2. Posterior end of body blunt, without cilia; one bristle or many bristles.... 3. caecata.

2. Posterior end of body rounded, the whole body covered with cilia; 3-4 bristles.... 3. lagenula.

Shape of body ellipsoidal or cylindrical, peristomium funnel-shaped without cilia.

2. One, spherical, peristomium short; 1 bristle. . 3. caecata.

2. Body cylindrical, peristomium long; 2 bristles. 3. gracilis.

1. Strobilidium caecata Clap. and L. ch.

Claparede and Lachmann 58; p. 514- 516, Pl. XVIII fig. 4 Bissing 60; p. 529 Kent 184; p. 666, Pl. XXVII fig. 2. Butschli 23; p. 1079-80, Pl. LVII fig. 1. Schewiakoff 187; p. 7-8, Pl. I fig. 1

Syn.: S. platystoma. Stokes 240; p. 211, Pl. I fig. 7.

? Strombidium agile. Stokes 240; p. 108-110, Pl. I fig. 18.

Strombidium gyrans. Stokes 240; p. 213-214, Pl. V fig. 20.

Pl. I fig. 3.

Body small form from 0,02mm.-0,024mm. long and 0,016-0,02mm. broad.

Body piriform, point of attachment at posterior end. Posterior part of body without cilia; cactus bristle single and attached at the side over the centre of the longitudinal axis of the body. Cilia long. Mouth at anterior pole of body; peristomium conical, sur-

[illegible] place of settlement for the Arctics. Anterior marginal lobe and [illegible] tentacles.

Mar. Fresh waters of Lake [illegible] and North America.

2. Distichella [illegible] Benham.

Benham 1914; p. [illegible], Pl. [illegible] fig. 1. Gatenell 23; p. 1078- 1080. Bonnevie 1927; p. 8-10, Pl. I fig. 2.

Synonyms: Pentatilemum [illegible] Braem 1897; p. 45, Pl. VIII fig. 8. Hyalinella [illegible] Pl. I fig. 6, Pl. VII fig. 178.

Zooids small forms from 0,08- mm.- 0,11 mm. long and 0,05-0,065 mm. broad. Body pyriform with rounded posterior end, entirely covered with chitin. At the anterior end the mouth is surrounded by a tentacle crown. At the posterior end the body is attached by a short stalk. Digestive tube with [illegible] tentacles. Mouth at anterior pole. Oesophagus terminal, funnel-shaped without lobes, leading to the middle of the body. Anus and contractile vacuole at oppisite end. 1 spherical ganglion and 1 myoneurales.

Mar. Fresh waters of [illegible] Islands.

3. Distichella [illegible] Bonnevie.

Bonnevie 1927; p. 33, Pl. II fig. 33, and also 1926; p. 10.

Pl. I fig. 6.

Very small form, 0,01mm. in diameter.

Body spherical; cilia not found at the posterior end of the body, so that a small place is left; in its centre is attached the long tactile cilium. Mouth at anterior pole: oesophagus funnel-shaped, as it. without rods. Anal and contractile vacuole at posterior end of body. Nucleus spherical and found near the centre of body.

Mat. Fresh water of the Neckar.

3. Amoebyla mira.

Pl. I fig. 8-10.

Form of body when stretched out, in the act of swimming, nearly as fig. 8 form of pear-shaped, mouth directed at the anterior end and enlarged at the posterior end. The anterior pole is cut off straight or slightly and occupied entirely by the mouth opening. The body changes it , in the highest degree, contractile and changes its shape very greatly, about ranging it from a pear-shape to a almost rounded plasmodium.

The whole body is equally and thickly covered with very small and delicate cilia, about in longitudinal furrows extending meridionally. Like the body contains the meridional furrows time of a spiral arrangement; one does not succeed in observing the specialized contractile elements of myonemes.

The entoplasm is extremely fine grained visible; it is in the form of a thin homogenous layer. The ectoplasm is slight, fine-grained and reminds one of the ectoplasm of amoeba. In the entoplasm occurs in some individuals (e. pupa) symmetric algae - Cosmarieae contractile, given to the individual a green color.

The mouth opening is placed at the anterior end of the body and oc-

[illegible] the [illegible] anterior pole. It is striking that in the majority of species can be seen only at the time of taking food, then whirled very energetically. The cilia about the mouth opening differ much from those which cover the rest body. Around the mouth there is no circlet of [illegible] (cirri). There is no cytopharynx but the mouth leads straight into the entoplasm.

The anus is placed at the dorsal pole. The contractile vacuole is single in the majority of cases and lies at the posterior end of the body not far from the anal opening. In M. arcuata (Pl. I fig. 10) are several (3-5) contractile vacuoles, arranged in one row from the anterior to the posterior end of the body in the plane in which the dorsal end of the body inclines.

The nucleus is always single, spherical, ellipsoidal or reniform. It is provided with a definite covering and shows a fine-grained structure. The nucleolus so up to this time has not been ~~has not been~~ discovered, although it doubtless exists.

Amoebyx is found in salt and fresh waters. It lives by preference on the bottom, in slime and among algae. Its division in fission is rapid and accomplished by rotation about the longitudinal axis of the body. The body in such a free swimming condition is always club-shaped. When it encysts, which happens not all at once but very slowly, the body becomes uniform, and the vibratile cilia take on a spiral arrangement. In slime and among algae, not having the possibility of free movement, Amoebyx moves about and takes on different forms, which strongly reminds one of the Amoebae which with its pseudopodia and only the presence of cilia shows it to be an attribute of the Ciliata. This metabolism promotes the extremely fine and faint differentiation of the entoplasm.

The food of Amoebyx consists of one and many celled algae, and also flagellata Protozoa. At the time of taking food the mouth may be very greatly

[illegible] as that Lhomely sometimes does (Imasoria) as large as itself in such cases the body is not to change its form beyond recognition.

Multiplication takes place in the free swimming or encysted condition. In the latter case the body falls apart by means of successive division into four individuals, which at the breaking down of the cyst[illegible] [illegible] Encysted specimens occur into the empty shells of other Lamellibranchs (for example, Cetacea).

The genus Lhomely in general resembles the genus Colpoda and differs from it only in very insignificant characteristics; namely: the ventral narrowing of the anterior end and the absence an oesophagus.

Many scientists unite Lhomely with the genus Colpoda formerly but not without some hesitation; if I have decided to leave them as an independent genus, it is only because at the present time Lhomely has been very little investigated (we found only one form) and our knowledge of its organization, on that account is very incomplete and does not give a sufficient foundation for combining them with Colpoda.

More or less certain species are distinguished:

1. One contractile vacuole.

a. Anterior end of body cut straight; nucleus spherical or ellipsoidal.

L. colpoda.

b. Anterior end of body cut obliquely; nucleus ellipsoidal..L. falcimen

1. Many contractile vacuoles; anterior end of body cut obliquely; nucleus ellipsoidal. L. arcuata.

1. Lhomely colpoda O.F. Mull.

Syn. Muller 1773; p.42, Pl. V fig. 23-26. Ehrenberg 1838; p.70, Pl.II fig. 1-3, 5 and 13; 38 p. 500,Pl. XXXI fig. 1. Diesing 50; p.105 and 550.-56; Perty 1852; p.143. Claparede and Lachmann 58; p.311.

[illegible] 1005; [illegible] 1041; [illegible] 1056; [illegible] 1067.

[illegible] 1081; [illegible] Fig. II 11. 34.

[illegible] 1082; [illegible] Pl. LII 11. 8.

[illegible] 1084; [illegible] Fig. 10-12.

[illegible] 1086; [illegible] Pl. I 11. 6-8.

[illegible] 1088; [illegible] 18.-30.; [illegible] Pl. LXII 11. 8.

[illegible] 1091; [illegible] Pl. II 11. 4.

[illegible] 1092; [illegible] Pl. I 11. 34.

Pl. I 11. 6.

[illegible] 0,00-0,17 mm. and 0,020-0,07 mm. [illegible]

[illegible]

[illegible] 20

[illegible]

[illegible]

[illegible]

L. [illegible] [illegible] 03; p. 101.-03; p. 501, Pl. [illegible] fig. 4.

Body small form 0,05-0,09 mm. long and 0,01-0,03 mm. broad.

Body pyriform, rounded at the posterior and conically narrowed at the anterior end. At the anterior [illegible] ciliation is small, but it round the [illegible] opening, without an oesophagus. Small cilia lie in mollifluous fluids which placed close to [illegible] anus at posterior end of body; somewhat to the side of it is the contractile vacuole. One ellipsoidal nucleus ([illegible]).

Hab. Fresh waters of Europe and Africa.

3. [illegible] Stokes [illegible]

Aspeside and Lohmann 03; p. 511, Pl. XVII, fig. 4. Fiorentini 03; p. 520. [illegible] 1543; p. 510, Pl. XXVII, fig. 14.

Pl. I fig. 10.

[illegible]-shaped form about 0,03 mm. long.

Body [illegible] like [illegible]. Body pyriform, rounded posteriorly and narrowed anteriorly to a conical shape. Anterior pole obliquely cut; the whole anterior end occupied by mouth; no oesophagus. Cilia [illegible] arranged in ciliated furrows. Anus at posterior end of body. Several contractile vacuoles (4-8), arranged in one row posterior to anterior end of [illegible] in the plane in which the anterior end of the body inclines. Nucleus [illegible], ellipsoidal; myonemes not observed.

Hab. Fresh waters of Europe.

4. Spathidium Duj.

Pl. I fig. 11-12.

Body of body cylindrical, equally rounded at posterior end. At anterior end of body somewhat narrowed, forming as it were a so called neck, then again widening out. Anterior pole obliquely cut and flattened; on

By observation [illegible] in E. gracilis found that the mouth lies at the posterior edge on the anterior extremity of the body, bordered by a delicate projection of membrane, forming a prominent lip.

The flagella and cilia are arranged in meridional rows; these longitudinal rows meet at one point at the posterior end of the body, while they extend over the anterior end in parallel rows, according to the arrangement of the mouth, meet the corresponding rows of the other side. Around the mouth opening is found a coiled or ribbon like cilia.

The cytoplasm shows a fine granular layer. The endoplasm is fine-grained but consists of many different inclusions, in the form of small granules and vacuoles, of which the latter is highly refractive.

The mouth opening is slightly oval occupies either the anterior extremity of the body or only the posterior part of it. It is visible only at the time of taking food, when it widens very considerably. There is no [illegible] around the mouth are placed patches of small trichocysts, which serve protective too. for besides food also. These trichocysts are helpful for the attack of prey and holding it, whilst.

The anus is placed at the posterior end of the body. Not far from it [illegible] Stein's observation several) contractile vacuoles.

The [illegible] nucleus is elliptical, alternate with [illegible] it is [illegible] with the longitudinal axis of the body, having at times a [illegible] outline; it has a fine reticular or alveolar structure [illegible] posterior nucleus. Near by lie several (5-8) spherical myxo-[illegible]. The spherical macronucleus [illegible] at the middle of the [illegible] and is [illegible] by one micronucleus.

Binary fission occurs in fresh and salt water. It feeds on other small [illegible] and so exhibits the typical infusorial form. For feeding and [illegible] its prey, it throws out the [illegible] to places near the mouth

Pl. II, fig. 11.

[illegible] fig. I have seen 0,61- 0,64 mm. long, and 0,50-0,53 mm. broad. Body oblong-ovoidal, rounded posteriorly, at anterior right and slightly cut below insertion of the ventral side. Ventral side more or less than the dorsal side. Cilia minute in motile stage. Anal [illegible] slightly out within a circle of ciliary point cilia. Cytoplasm dark in the posterior part of the organism anterior to the body; [illegible] [illegible]. Anus and contractile vacuole at posterior end of body. Macronucleus ellipsoidal; 0-0 mm., spherical micronuclei.

Hab. Fresh and salt waters of Europe and Africa.

2. Spathidium flexostylum Entz.

Entz. Ebdp. 1898-1901 Pl. III fig. 12.

Pl. I fig. 12.

Body about 0,15 mm. long and 0,07 mm. broad.

Body oval or oblong-elliptical; rounded posteriorly, at anterior right and slightly cut. Anterior margin extends long ways; oral anterior margin is found a little more oblique. No basal cilia. Cilia short, ventral side rather dense. Cilia arranged in meridional rows. Mouth more oblique, a groove of large cilia. Anus and contractile vacuole posterior end of body. Macronucleus spherical.

Hab. Fresh waters of Europe.

3. Cranotheridium Schön.

Pl. I fig. 13

Body obtong-ovoid, somewhat narrowed and rounded at the posterior end, [illegible] the anterior flattened from the dorsal ventral oblique, in a plane to the ventral side. At the posterior part of the flattened anterior end [illegible] somewhat [illegible], while the convexity of the dorsal side

lies below the anterior end then on the ventral side between the rather opaque nerve cords. The first leg is covered with rather long cilia. which is longitudinal axis. On the dorsal side the longitudinal ridges extend medianwards, terminating at the mouth opening; when the sides they advance at first vertically, and then curve in a semi-circular manner towards the anterior end of the body and pass parallel to the mouth opening, which part unites with those on the ventral side of the anterior end of the body. The longitudinal ridges on the ventral side have a line arrangement.

The entoplasm corresponds to an external plasmic and a rather thin strictly alveolar layer. The entoplasm is coarse granular and contains chromatin. The exterior, transparent part of the body is full of small hyaline protoplasm, the so-called cortical plasma.

The mouth opening lies at the anterior end of the body, at the ventral angle of the oral papilla. The rather long tubular oesophagus is provided with longitudinal ridges or rods, forming by their union the so called tuba. This oesophagus is enlarged at the beginning to gum-ship, and then narrows gradually and extends straight down in the plane of the longitudinal axis; the rods forming it have a spiral arrangement.

Just the contractile vacuole lies at the posterior end of the body. The excretion membranelles are somewhat in decline turn and is found in the longitudinal axis of the body; its structure is fine alveolar. Many small, round and homogeneous myelondriei lie near the membranelles, the nucleus lies rather slow. When swimming, the animal always runs the body, this movement which is generally accompanied by a slow rotation around the longitudinal axis. When swimming, it plainly the

rotate, body not at all constricted, tapering gradually from the base to the apex. The body is crenulated plicate but not contractile.

A single species:

1. Chaetosiphon tenuistylus Sanders.

Schneidertil 1850: p. 30-31, fig. 11 & pl. 30-33. 1851: p. 10-17.

Agamo?? fistulatum Leuckart. Archiv 0:, p. 23 fig. 3-4.

Fig. 1 & pl. 13.

Length 0,17 mm. (on) and 0,30 mm. (ad).

See characteristics of genus.

Hab. Fresh waters of New England.

2. Lagynus caecus.

Fig. 1 & pl. 14-15.

Body elongate-cylindrical, broader posteriorly, gradually or at once narrowed toward the anterior end, sometimes but into a more or less elongated neck, sometimes this cut off straight at the anterior end. Posteriorly the body rounds over a little and consists of two parts- the body itself and the neck. The latter is terminally contractile, while the body also can shorten much, so that Lagynus becomes pitcher or is taken out in length. Neck contractile, in the neck there are rounded at times constrictile constrictions so that the neck consists as it were of ring-like divisions. The mouth opening lies at the anterior end of the body.

The whole body is covered with rather fine and long cilia, which, arise in longitudinal rows, extending meridionally from the anterior to the posterior end of the body. At the anterior end of the body, around the mouth opening is found a corona of rather long cilia, which, by the contractility of single cells in the L. crassicollis.

...ridi but straight. Mandibl mostly dusky at extrem; and ...ginning by
...ervals of large cells. Second antennal articles, ...ecially the
...ppermost. Head and corneolae visible at posterior end of body. Ventri-
...al ganglia separated by posterior part of body.

... Pres. table 8. Habit and habitat see Key to species.

2. Leptus ...ssimilis Map.

...ptus ...; p. ...-... Fl. ... Fig. 26-27.

...ptus ... (Leptus ...) Dug. ... Mem. 30;

p. ...-... Fl. ... Fig. ...

... Leptus ... Stein, 20; p. ... ...

... Leptus ... ...el 110; p. 669- 10 Fl. ... Fig. 37-38.

? Leptus ... Say, 36; p. ...-... Fl. ... Fig. ...

Fl. I Fig. 15.

... ... ,17-...; mm. ... ... ,05-...4 mm. ...ide.

... dusky-yellowish, quality ...ounded at posterior end. Mouth ...
...ormed at anterior end, ...ib into ...ous ...gus, at the ...inner ...ntia-
... to proto-stage, and ...en ...arrowed to a ...straight, ...ewhat ...ptuse. Palpi
... of ... not ...ifferentiated by ...ols. Anus ...ntroterminal ...o-
...ted at posterior ...d of ...dy. Ventricose or ...ntinous ...ticles in post-
...ior ...alf of ...dy.

... Modification and ...ntrols of ...ysis ...n Ixia

7. Trachelotarsus ...ilus L.

Fl. I Fig. 16.

...ot, ...ot, ...olated at the posterior end ...n ...ginally ...rrowed at
...e ...ntrior ...d, ...rming a kind of neck ...t ...n straight at the front. A-
...ve, the ...ole ...gth ...e ...dy is ...ch ...attened ...d ...poris ...ceiore
...ly ... ...rrow. It is ...vered ...th ...mall ...d ...ne ...ills, ...tending ...n ...ng-
...tudinal ...ds, from the ...terior ...d the ...sterior ...e. Around the mouth

[illegible] the anterior end is provided with a [illegible]

[illegible] is also [illegible] to envelop a [illegible] by a [illegible] of pseudopodia which, [illegible] when [illegible] to the external surface of the organism. The entoplasm is clear, transparent, and usually includes a large number of vacuoles, extremely fine, highly refractive granules.

The nucleus of the [illegible], found on the anterior pole of the body, [illegible] and stongly flattened oval. Around the nucleus [illegible] are found [illegible], highly refractive rods. Sometimes quite [illegible], either by ectosomal emission or [illegible], occurs in some individuals of the ectoplasm around [illegible]. The [illegible] and [illegible] are very [illegible]. At the posterior pole of the body, i. e. diametrically opposite the mouth opening, is found the anus. Near it is found the contractile vacuole, enclosing some small chance or secondary vacuoles, which form large vacuoles at the time of diastole and later systole immediately unite with the vacuole. The contents of the contractile vacuole pass out through small but narrow canals, lying in the ectoplasm and opening by specially ectosomal openings, at the posterior pole of the body, not far from the anus.

The [illegible] are consist of two ciliary bodies, united in all [illegible] by means of long and fine threads. Four [illegible] myonemules also cross inside the [illegible], generally by twos near each end of it (internal from ciliary [illegible]).

Trachelophyllum occurs in fresh water, rich in H_2S. Its movements are [illegible] and not specially quick. It moves about until the algae either by means of the fine and friendly set cilia on it [illegible] on one of its flattened sides. Its [illegible] mouth it is not at times accompanied by [illegible]

[illegible] not yet [illegible] [illegible] [illegible]

ner Zeitschr.

C. Lachymalia Salt.

Fl. I Fig. 17-19.

Body small, ovoid or obtuse-cylindrical, rounded evenly or tapering at the posterior end; the anterior end is narrowed and either cut off straight (L. obtusata) or from the first it declines at greater or less length (i. e. also 2-3 times the length of the body) into the most contractile of necks. At this anterior end of the body is found a small conical invagination of body, cut off straight, the so-called Aula, separated from the Atrium (L. vestibule) or neck (L. also the L. jugularis) by a delicate constriction.

All the body equally covered with small, cellulose cilia. Most cilia are on small papillae in longitudinal furrows, extending spirally from here to right from the anterior (straight cut) margin of the Atrium or neck to the posterior pole of the body where they meet in one point. In the extended condition the spirals of the furrows are not tightly coiled, so that they appear as approximate meridional, longitudinal furrows; in the contracted state (when Lachymalia has almost a spherical form), the spirals are tightly coiled and may be seen to be transverse stripings. The ciliary furrows present bright hyaline stripes, alternating with colourless convex, wide, fine-lined and strong lined stripes. The distance between the adjacent ciliary furrows is different in different species. The anterior, conical hump or neck is also covered with cilia, which is considerably finer and two or three times longer than that on the body. They are on small but clearly seen papillae and arranged spirally in rows, while the distance between the rows of cilia on the neck is twice as small as that on the body. The cilia cover either the neck up to the anterior straight cut margin, or only the post-

...ical pole of it (i.e. cytostome), serving the entrance into the ...pharynx in the anterior end of the cell. The pharynx, ...t tubular, ciliated in side.

...K... ...consists of an external, thin ...ectoplasm, and a ...ner, not very sharply ...ed, endoplasm. The ectoplasm is ...ar and in it are ...ed with a ...ar ...ion vesicle. This con...ains at the ...ginning, I mean, either ...ly or ...ly ...ensive ...s, as it seems, ...pends on the amount of food taken in. Beside ... the ectoplasm at the anterior ... of the body, i.e. in the head ...ity, is ... seen, there is found a ...ight almost ...-like protoplasm, ...ed ...aining ...ular matter and ...ing of those characteristic move...ts, also ... constantly observed in entoplasm. This is the so-called ...ractile ...asm, as the highest degree contractile as it seems, by attentive study it is ...ssible to ... out, that the contractile protoplasm is ...anged in the body of the ...ervision in the form of a very thin, trans...ent layer between the ecto- and entoplasm.

The ... mouth opening is found in the anterior pole of the body, at the end of the conical ... It leads into the tubular, ciliated pharynx and ... a bit ...ected, occupying ...proximately two thirds of the ...gth of the head. The wall of the ...ected is ...ormed by short ... ...ing, ...ly ...ective ...s, extending ... ...ght ... of ...ately curving ... cilia.

The ... is placed at the ...terior end of the ...y,-immediately in the ...nter (in ...ms with ...ally ...ed ...terior ...ds), or a little to the ...ide, but ... the ...terior pole (in ...ms with ...ly ...ed ...terior ...s), near ... which ...ening is ...nd also the ...ntractile ...uole, ...ening ...ly ... the ...s ... at the ...terior pole ... very ... it. ... ...ere ... two ...ntractile ...uoles, ...ening ...wards ... the ...ide,

i. the anterior and posterior ends of the filaments will contract alternately.

The macronucleus ellipsoidal, sometimes it consists of two ellipsoidal parts, with a small connecting piece between them. The micronucleus is small spherical, lies close to the macronucleus or between its two parts.

Lacrymaria lives in salt and fresh water. Its motion is strikingly, as they move the dorsal tentacle by rotation while the longitudinal axis remains fixed, now extend it very much then shrinking, bring it now to one side, now to the other, as it hunts for its prey; this phenomenon forcibly strikes the eye, if Lacrymaria is swimming about in one. while swimming they change direction every moment; at times they stop and lie still, only moving the tentacle a little,to different sites. The body, in particular the head and neck, are in the highest degree contractile; at the time of contraction the infundibulum stops completely and changes its form entirely spherical, becoming at times entirely spherical.

The food of Lacrymaria consists almost exclusively of small infusoria, such as Enchelines, Colpoda, Paramecia, while mouth and oesophagus are enlarged very considerably. When seizing food they stop, move the tentacle, and then again upon the prey.

Multiplication takes place with the help of transverse fission in the free swimming condition. Conjugation has also been observed. The cysts are spherical and are covered with a rather thick membrane.

3 species of Lacrymaria are distinguished:

1. one contractile vacuole.

2. Body without neck, conical head with small constriction; only its posterior part covered with ring cilia... L. coronata.

3. Body with neck, conical head all over set with long cilia.

L. olor.

1. [illegible] [illegible]....L. oroi.

[illegible] [illegible] [illegible] [

Trachelocerca viridis. Stein 216; p. 66.

" sinuosa. Fritz 134; p. 166, Pl. V fig. 17. Pl.I fig. 11-15.

" sp. Entz 86; p.343, Pl. XXVIII fig. 8.

" subtilis. Dent 134; p. 810, Pl. XLVII fig. 33.

" tubicola Schewiakoff 152; p.64-66, Pl. V fig. 15.

T. sp. Entz 86; p.108...88; p.513, Pl. XLI fig. 18.

T. sp. Fritz 134; p. 166.

Pl.I fig. 17.

Large and very large forms. In an extended condition 220-300,1-0,5mm. long and 0,1-1 mm. broad.

Cylindrical, posteriorly pointed body with the anterior end narrowed and prolonged into a long (5-6 times the length of the body) and delicate neck, at whose end is found a small oval head. The mouth at the anterior end of the body, leads into a short, conical oesophagus, surrounded with teeth. Anus at posterior end of body, somewhat to the side. 2 contractile vacuoles at the side of the trunk. Makronukleus consists of two ellipsoidal bodies connected by a narrowed band; between these is the micronucleus.

Hab. Fresh waters of Europe, America and Oceania, and also the Mediterranean Sea (Gruber 116; p. 401).

2. Trachelocerca coronata Cl. and L.

Trachelocerca coronata Cl. and L. 58; p. 303, Pl. XVIII fig. 6. Stein 78; p. 333. Dent 134; p. 810, Pl. XLVII fig. 28. Maupas 167; p.198-202, Pl. XII fig. 3-8. Schewiakoff 152; p.264. Gourret et Roeser 116; p. 400-407, Pl. XXVIII fig. 10-17. Entz 86; p.1033-1034, Pl. LVII fig. 3. Schewiakoff 190; p. 57-58.

Lynceus [illegible] Cohn 45;p. 565, Pl. II fig. 47-48.

" [illegible] 175; p.191, Pl. VII fig. 15-16.

L. [illegible] 194 ; p.616, Pl. XVII fig. 26-27.

L. [illegible] Sigma 114; p. 71-74, Pl. II fig. 8.

? L. [illegible] Daday 7; p. 471.

" [illegible]ensis 100; p.10-11, Pl. I fig. 6-8.

? Eulimnadia [illegible] Colosanthi 175; p.176, Pl. VII fig. 8-10.

Pl. I fig. 10.

Forms of medium size from 0,07-0,10 mm. long.

Body [illegible]-cylindrical, pointed at the posterior end,at the anterior end [illegible]-shaped and obtusely straight into the head. Head conical sharply separated from the trunk by a ringlike furrow.At the right of the head it tapers obliquely, with its lower part is swollen out. Only this lower swollen part has tiny cilia. The round mouth opening is found at the anterior pole of the head. Oesophagus conical, short, occupies two thirds of the length of the head and is surrounded by long, equally arranged spines. Near the posterior pole contractile vacuole at the posterior end of the body. The mandibulae is long ellipsoidal,somewhat [illegible]-shaped or reniform; beside it lies the small spherical myxomandibulae.

Mediterranean (shores of Italy and Algeria), the north, Baltic, Black and Caspian Seas. Salt water about the normal [illegible].

3. Lepidurus [illegible] Cr. and L.

[illegible] Hansen 53; p. 302-303, Pl. XIII fig. 7. [illegible] 100; p. 8-10, Pl. I fig. 7. Stresing 50: p.53. Ulyanin 203; p.55. [illegible] 73; p.47-50,Pl. XIVII fig. 34. Khrusova : p. 254. [illegible] 154; p.617-618, Pl. XVII fig. 34.

Syn.: L. [illegible] Flommenfeld 153; p.333, Pl. IV fig. 11.

... 1 fig. 1a.

Small shell about 0,37 mm. long.

Body oval, bottle-shaped, posteriorly ovate and equally rounded, frontally tailored at the anterior end, forming a small beak. The head, separate from the neck by a ring-like furrow, is small, covered continuously with a ciliary arranged cilia. Mouth at anterior pole, the conical oesophagus surrounded by cilia. Anus and contractile vacuole at posterior pole of body. Nucleus spherical or ellipsoidal in the middle of the body.

Arctic Atlantic Ocean, Baltic and Black Sea.

? 4. Lacrymaria vermicularis O.F.Mull. sp.

Plate III 103; p. 202-203, Pl. IV fig. 5.

Lutschn 203; p. 1004.

Synon.: Fibrella vermicularis. O. F. Muller 103; p. 100, Pl. XXVII

fig. 1-4.

Vorticella vermicularis. Ehrenberg 38; p. 111...38; p.534,Pl. XXVI

fig. 6.

" " Claparède 57; p. 472-473.

" " Diesing 50; p.157 and 511...59; p.514.

" " Perty 104; p. 166.

" " Claparède and Lachmann 58; p.504-505, Pl. XVIII fig.6

" " Kent 104; p. 514,Pl. XXVII fig. 30.

" vivipara. Ehrenberg 38; p. 11. .66 p.534, Pl .XXVI fig. 4.

" " Diesing 50; p.158 and 511...59; p. 514.

" " Perty 104; p.166.

Body small shell about 0,05 mm. long.

Body cylindrical, short, posteriorly rounded without beak), separated by a ring-like furrow from a frontal head, provided at the anterior end with a cushion of large cilia. Mouth at the basal of head. Con-

[illegible] [illegible] at posterior end a [illegible] nucleus [illegible].

[illegible] [illegible] [illegible].

3. Trachelocerca [illegible].

Pl. I fig. 20.

[illegible], in an extended condition, extremely long, vermiform, [illegible] and flattened from the sides and then slightly [illegible]. At the posterior end the body is either [illegible] narrowed and extends into a pointed tail or is equally rounded; at the anterior end the body is also always narrowed, forming an extremely long and [illegible] neck, enlarged and cut off straight at the anterior end. At the anterior end are found 4 nipple-like [illegible], a long slit-like bodies and surrounding the round mouth opening; in some [illegible] one can see in addition to the 4 nipples, 4 more [illegible] alternating with them. When the mouth closes these nipples or lips are sometimes [illegible] together, forming them a sort of conical head. When the mouth opens and is widely extended the nipples form a kind of continuation or thickened rim(rounded lips) , bordering the mouth opening. At times these nipple-like lips may be [illegible] and then no trace of them remains.

The whole body is equally covered with rather long, and fine cilia, [illegible] in longitudinal rows, extending meridionally from the anterior to the posterior end. At the posterior end of the body the cilia are somewhat longer than the others, but at the anterior end of the neck, i. e. just above of the nipple-like lips, are found the coronal longer and thicker cilia, the inner of one consisting of longer cilia than the outer. Under the longitudinal rows of cilia are seen fine, highly refractive fibrillae or myonems, ~~causing~~ the contractility of the body. The contractility is very great, the body shortening to one tenth its length and then taking an egg-shaped form, having entire rows of rounded trans-

verse folds or constrictions.

The cytoplasm is extremely ~~thin~~ thin homogenous. In it, or more exactly, under it are the trichocysts, axles, nucleoli, are not often seen in dry specimens. The cytoplasm is extremely varied in appearance, depending on the purity and quantity of food taken in. Thus, in some examples I typically large ones might be seeming on the presence of many vacuoles, while in others it is fine-grained and at times of white colour. In the cytoplasm is observed a large or small quantity of fine, extremely refractive oil-like, non-miscible globules.

The round mouth opening at the anterior end is surrounded by 4 oblong-ovate lips and a corona of large cilia. When feeding, they the mouth is pretty evident and the lips take the appearance of a thickened marginal line. The mouth leads into the rather long, funnel-shaped oesophagus, simple filaments are not surrounded by folds.

Two contractile vacuole are found at the posterior end of the body. An open externally in forms with rounded posterior ends at the same pole, while in forms with pointed ends, they open somewhat to the side but near the pole.

The nucleus is found in the middle of the body and has an ellipsoidal form. Usually found in all specimens examined by him one to a large number of small spherical nucleoli, scattered irregularly throughout all the cytoplasm. Specialized cells, which might correspond to the gametocytes, have not been observed up to this time.

Trichocysts is found in salt water amid algae, by preference in places rich in decaying matter.

Trichocysts for the most part lies quietly in one place. Its movements are extremely varied: at one time it crawls about, then rolling up in a ball, then unrolling, it twists about like a worm, then it climbs

anil the fixation &c. &c. Although in general it moves most little, it nevertheless turns about at times rather quickly and equally well whether the anterior or posterior end takes the lead. When swimming Trachelocerca ~~retracts~~ relaxes and takes the form of a cylindrical rod; with a rather slow movement it bends about like a snake and often changes the direction of its movements. The body is in the highest degree contractile and metabolic. When contracting the body retires almost instantly, forming over its entire surface rows of transverse ringlike folds. It relaxes slowly, although at times not equally, so that there remains of the body quite irregularly arranged indications the constrictions.

The food consists of small Infusoria &c. &c., which often constitute the color of the body. When seizing prey the mouth opening may be greatly enlarged, so that Trachelocerca swallows food whose diameter surpasses, at times the diameter of the mouth opening. When the prey passes through the oesophagus it dilates greatly. Multiplication occurs in the encysted condition and consists in the division of the contents of the cyst into two individuals.

A single species.

1 Trachelocerca phoenicopterus Cohn.

Cohn 45; p. 202-204, Pl. XIV fig. 1-3. Quennerstedt 160; p. 13-14, Pl. I fig. 9-10. Kent 154; p. 810, Pl. XXVII fig. 32. Stokes 116; p. 401. 116; p. 88-89. Lnt. 80; p. 315-320, Pl. XX fig. 1-7. Collinet and Guerin 116; p. 400, Pl. XXVII fig. 14-15.

Synon.: T. sagitta. Quennerstedt 97; p. 202.

" Stein 216; p. 72 and 80, Pl. 220; p. 32.

T. tentaculata Quennerstedt 160; p. 14, Pl. I fig. 11-12.

" Kent 154; p. 817.

T. minor Stokes 116; p. 88, Pl. XI fig. 1-2.

p.p. Chaenia teres. about 1 mm; p. 82, Pl. XVII Fig. 4.

C. ribbo sp.? Schmarda 1871; p. 58-61, Pl. VIII Fig. 11-1

Pl. I Fig. .

Very large forms in the extended condition from 0,4-1 mm. long and 0,6mm. broad; in contracted condition from 0,15-0,19 mm. long.

Description of body.

Ant. triporth sole (Hollybottrichia, Lepidochaeta and Notochaeta).

Ist. Prototroch small.

Pl. I Fig. 21-23, Pl. II Fig. 23, Pl. VII Fig. 1a,1bc and 1e4.

Form of body spherical, ellipsoidal or cylindrical, usually rounded at both poles or sometimes flattened, but always regularly rounded at the same time at the majority of species. Outer symmetry of body in a circular transverse section, in some species, however, the body is more or less flattened from the sides and shows an ellipse in cross section. In front the sides of the body valles in one and the same species according to the amount of food extrem.

The whole body is closely covered with cilia, not especially long on sides, which at the dorsum and in thicker but usually smaller. At the posterior end of some species (C. teres) the cilia are considerably longer than those covering the body, and at other species (C. ribbo) they are almost twice as long as the rest and form a sort of tuft. The cilia are on small elevations or papillae in series from student figures, extending radially from the dorsum to the posterior end between the rudiments the circular elevations, forming the so-called ciliary striations. On the external surface of the filled stipes these stripes are visible especially prominent in the contracted condition of Protoura. The number of the ciliary longitudinal furrows is extremely variable

(40-100)

but for each species more or less constant.

Under the ectoplasm lie the specialized contractile elements of the locomotor system, on which depends the contractility of the body of the Protozoon. In all probability these myonems occur in all species, since they are all in the almost ideal contractile, though as to the structure of myonems it is possible to speak only with certainty in the case of Fl. telum, in which I have observed these elements. They appear as fine, highly refractive threads or filaments, enclosed in a common longitudinal sheath filled with fluid. The sheaths are arranged meridionally, immediately under the longitudinal ciliary furrows. All they lie in the alveolar layer of the ectoplasm.

The ectoplasm consists of the alveolar layer, attaining in different species different thicknesses, and an external cuticular film, transparent colorless. This layer is at times covered with a fine and quite transparent, continuous layer of varying thickness, in all probability a product of excretion of the ectoplasm. In Fl. almatus (Fl. I fig. 25) in the alveolar layer of the ectoplasm the small, spherical trichocysts. They are not distributed over all the body, but concentrated at the anterior pole and on approaching the middle (equator) become later, diminishing also greatly in size. The ectoplasm is a non-living and cuticle only living contractile structure.

The mouth opening is found at the anterior end of the body, not on the ventral, but a little to the side, separated more or less from it. By the position of the mouth, and also by the formation of the oesophageal ridges from the gross description which is very true it can never Protodon
be said has a fixed position. The mouth opening is slit-like and has an irregular and variable outline. In the majority of species it lies in the middle of an elliptical field, thickly covered with fine cilia, forming

s they meet a cast of its appearance, rising about the mouth opening. In forms with flattened bodies, the longitudinal (long) axis of the mouth slit lies in the plane of the flattening of the body.

The mouth opening opens into a tubular conical oesophagus narrowing as it goes in, varying in length in different species. In some (P. teres, P. filiformis, armatus) it is rather short and opens usually into the entoplasm, while in other species (Pl. elentatus and P. rictus) it is very long, either one third or one half the length of the body, and in Pl. niveus it almost reaches the posterior end. According to the shape of the body and usually according to the shape of the mouth opening, the oesophagus has either a regular conical shape or it is more or less flattened in the plane of the flattening of the body of the infusorian. The walls of the oesophagus, of more or less thickness, consist of rather dense protoplasm, being made of thoroughly differentiated internal protoplasm. Around the walls of the oesophagus are arranged fine plasmatic rods, forming when they meet a conical knot whose form corresponds to the form of the oesophagus. These rods are found in almost all species, with the exception of Pl. elentatus, which has a long , conical oesophagus without rods. In the first case(Pl. niveus and rictus) they lie separate from one another, or less than in the external wall of the oesophagus. They are in straight or spiral lines, extending always towards the posterior end; their length corresponds usually to the length of the oesophagus. In the majority of species the rods are closely united in a special conformation apparatus, surrounding the oesophagus and forming something like a creel, used in fishing. This apparatus moves freely along the walls of the oesophagus and can at need be thrust out or drawn in; in the passage of captured food through the oesophagus, the apparatus together with the oesophagus can be greatly enlarged, thus letting pass food of very large dimensions.

At the posterior pole of the body is found the anus, in some species to the side, in some species visible at all times, in others only at the time of defecation.

Not far from the anus in the majority of species is placed one contractile vacuole; it lies in the entoplasm, more exactly, on the border of the entoplasm and the alveolar layer; in the latter is found a small and narrow canal, opening outwardly by a small excretory opening, lying in one of the ribbed stripes. Through this canal and opening the contractile vacuole excretes its contents. Around the contractile vacuole are found in some species (Pl. niveus and faletus) at the time of diastole certain small, so-called secondary vacuoles, which grow gradually by the union of other small vacuoles and immediately after systole they all unite in one large contractile vacuole. In other species (Pl. teres) the small secondary vacuoles instead of being arranged irregularly about the contractile vacuole are arranged radiarly in four rows always diminishing in the size of the vacuoles. Immediately after systole the four large vacuoles unite in one, while others take their places and always enlarge ~~enlarge~~ at the time of diastole. In some examples of Pl. teres I have found in place of four rows of secondary vacuoles diminishing in size, four secondary canals, uniting after systole in one contractile vacuole. In Pl. ~~marga~~ margaritifer instead of one contractile vacuole at the posterior end of the body there are several, arranged without any definite order throughout the surface of the body and contracting at different times.

In the majority of the species the macronucleus is ellipsoidal and lies either at the center or in the posterior half of the body. In Pl. faletus and niveus it is long cylindrical, arranged along the longitudinal axis of the body and is bent in a bow-shape or in the shape of the letter "S." In Pl. margaritifer the macronucleus has two ellipsoidal parts

united by a small space. With the exception of the cytoplasmic membrane which has the usual reticular or alveolar structure) all the rest of the nuclei of Prorodon have a peculiar structure. In living specimens the macronucleus appears homogeneous and has in the center a much darker concentric body, joined to the wall of the nucleus by fine connecting strands. In fixation the nucleus appears reticular or alveolar in structure- but strictly in parts near the wall, in the interior body and its connecting strands, while all the rest is homogeneous and consists of all probability of vacuoles enclosed in the protoplasm of the nucleus. The micronucleus is far from being found in all species. It appears ellipsoidal, lies close to the macronucleus, and has usually two parts: a large one, longitudinally striped, chromatic and a small one, homogeneous and achromatic.

Prorodon is found in fresh water, swimming for the most part on the surface and algae, and not lasting in putrid water. The movements are normal, rather quick, and accompanied usually by rotation about the longitudinal axis of the body. The body is supple and contractile; the color is exceedingly variable - some species (Pr. niveus and margaritifer) are entirely transparent and colorless, while others are grayish or greenish. In some species the color changes often and depends, it seems, on the food taken in.

The food consists almost exclusively of one-celled algae, although some species give evident preference to the drops of fat, found in cold microscopic crustaceans. Prorodon is very voracious and sometimes gorges itself so that the shape of the body changes beyond recognition.

Prorodon multiplies by cross division in the free swimming state, and also in the encysting condition. The cysts have very fine membranes.

direct in this case the resting cyst, having direct a t ic. membrane 3 times double.

6 species are distinguished:

1. Two contractile vacuoles at posterior end of body.

2. Oesophagus surrounded by rods.

3. Nucleus ovoid- cylindrical, ribbon-like; around the oesophagus separated rods.

4. Body ellipsoidal, strongly flattened from the sides, oesophagus broad, flattened. Pl. divesus.

4. Body cylindrical, oesophagus conical, narrow. Pl. laictus

3. Nucleus ellipsoidal: a special oesophageal apparatus.

4. Body spherical, flattened, containing trichocysts.

Pl. dimatus.

4. Body ellipsoidal without trichocysts. Pl. teres.

2. Oesophagus without rods, nucleus ellipsoidal..Pl. duentatus.

Several contractile vacuoles, oesophagus surrounded by rods. Pl. malleifer

1. Plagiodon divesus mihi.

Entz 84. p. 300,322, Pl. II fig. 2.- 86; p. 155.- 86; p. 515, Pl. XXII fig. 10. Maupas 87; p. 501. Cohn 41; p.271, Pl. XIII fig.3 Perty 164; p. 147. Stein 214; p. 5-7. 215; p. 161.--226; p.80,81. Claparede and Lachmann 58; p. 315. Diesing 65; p. 175.--66; p. 836-836. Kent 154; p. 462, Pl XXVI fig. 35-36. Balbiani 15; p. 35-71, Pl II fig. 1-4. Synon.: Pl. volan. Perty 164; p. 147, Pl. III fig. 5.

" Diesing 66; p.836.

Pl. I fig. 21.

Very large form from 0,20-0,5 mm. long and 0,12-0,2mm. broad.

Body ellipsoidal, somewhat narrowed at the anterior end, equally

reduced and rather strongly flattened from the sides; a cross-section gives an ellipse. Mouth ventral, near the anterior pole; oesophagus long, flattened, surrounded by rods, extending almost to the posterior end of the body. Anal and contractile vacuole with many secondary vacuoles at posterior pole of the body. Nucleus long, cylindrical, bent into the shape of the letter "S".

Hab. Fresh waters of Europe.

2. Prorodon teres Ehrb.

Ehrenberg 38; p. 506-512, Pl. II fig. 3...38; p. 518, Pl. XXXII fig. 11.
Claparède 57; p. 501... Diesing 50; p.173 and 547...50; p. 538.
Dujardin 41; p.260-273, Pl. XIII fig. 1-4,a...Perty 52; p.147...Stein 54; p. 213...61; p.32,36,38,38 and 100....200; p.36,38,37,38, and 199.
Claparède and Lachmann 58; p.318...Engelmann 76; p.538.
Fromentel 74; p.200... Kent 81; p. 432...Maupas 84; p.272-275, Pl. XVI fig. 1-28... Butschli 85; p.1002, Pl. XLII fig. 3.
Schewiakoff 87; p. 13-14, Pl. I fig. 3-13, ..188; p.37 .
Syn.: Pl. teres. Claparède and Lachmann 58; p. 318-320, Pl XVIII fig. 3
" Diesing 50; p. 540.
" Kent 81; p.432.
Pl. flammatis. Stokes 240; p. 149-150, Pl. IV fig. 3.
Pl. I fig. 22, Pl. VII fig. 188 and 194.

Medium and large forms from 0,30-0,25 mm. long and 0,06- 0,17mm. broad.

Body truely ellipsoidal. Mouth ventral near the anterior pole. Oesophagus conical, short, surrounded by a conical row of palatus. Anal and contractile vacuole with four rows of secondary vacuoles arranged radially at the posterior end of the body. Macronucleus and the hyaloid lobs lying

nucleus ist ellipsoidal.

Hab. Fresh waters of Europe, Africa, America, Australia to New Zealand.

5. Prorodon armatus Cl. and L.

Claparede and Lachmann 58;p. 522-523,Pl. xviii fig. 2....Biesin, 00;p.040 Kent 154;p. 400-405.

Pl.I fig. 23.

Forms of medium size ca. 0,1 0,3mm. in diameter.

Body almost spherical, somewhat gallows at the anterior end and flattened from the sides. Mouth in the shape of a longitudinal slit somewhat to the side at the anterior end of the body, Oesophagus broad, short flattened from the sides and surrounded by the same rod apparatus. In the anterior half of the body are trichocysts in the alveolar layer, gradually diminishing in size and becoming later nearer the equator. Anus and contractile vacuole with four secondary ones at post rior end of body. Nucleus ellipsoidal.

Hab. Fresh waters of Europe.

4. Prorodon edentatus Cl. and L.

Claparede and Lachmann 58;p. 521,Pl. xviii fig. 4...Kent 154; p.405,Pl. xxvi fig. 43 .

Synon.:Gymnopharynx typicus. Biesin, 00;p.020.

Pl.I fig. 24

Forms of medium size from 0,7-0,30mm. long.

Body ellipsoidal,equally rounded at both poles. Mouth opening oval at the anterior end of the body ,to the side. Oesophagus conical,long, extending over half the length of the body,it lies obliquely to the longitudinal axis and is without rods. The cilia at the posterior end are long and form a kind of cuit. Anus and contractile vacuole at the posterior end of the body. Nucleus ellipsoidal.

3. Prorodon margaritifer Cl. and L.

Claparede and Lachmann 58;p. 522-523,Pl. xviii fig.1.

Biesin, 00;p. 010...Kent 154;p. 405,Pl.xxvi fig. 44.

Pl.I fig. 25

Length forms to Commensalism.

Body cylindrical, enlarged at the front and narrowed at posterior end but equally rounded at both poles. Slit-like mouth at anterior end of body at the side. Oesophagus small,conical,slightly curved to the side,extending obliquely to the axis of the body,and surrounded with ten appendages. Contractile vacuoles scattered throughout the body. The Nucleus consists of two ellipsoidal bodies connected by a spherical body of smaller size.

Hab. Fresh waters of Europe.

d. Prorodon farctus Cl. and L.

Prodon. 56;p.541 .. Entosoon 23;p.1052,Pl. LVII fig. 4.

Syn. Enchelys farctus. Claparede and Lachmann 58;p.510-517 Pl. XVII

" " Stein 28?;p.58 fig.5

" " Kent 84;p.503-504,Pl.XXVI fig.61-63.

" " Maupas 88?;p.38-41,Pl.III fig. 8-10.

" " Entz 84;p.380..188;p.382.

Pl. II fig.26.

Length from to Commensalism.

Body ellipsoidal-ovate somewhat narrowed at the anterior and enlarged at the posterior end, but equally rounded at both poles. Oval mouth opening near the anterior pole. Oesophagus long,conical,extending to one third the length of the body, surrounded by long rods. Anus and contractile vacuole, surrounded by many secondary vacuoles,at posterior pole of the body. Nucleus long, cylindrical,bent to a bow-shape.

Hab. Fresh waters of Europe and America.

11. Perispira Stein.

Pl.II fig. 27.

Shape of body ellipsoidal or ovate,equally rounded at both ends or somewhat narrowed, but in this case rounded at one end. The whole body equally Covered with fatter long cilia, placed in smaller rows. These

furrows are arranged spirally and lead from left to right from the anterior to the posterior pole of the body. The ciliary furrows alternate with faintly ciliated ridges. Parallel with these furrows and consequently also spiral, there extends from the anterior to the posterior end of the body a furrow not specially deep but rather broad and covered with ciliated bristles arranged in two rows.

The endoplasm is ~~clear~~ clear, almost homogeneous. The ectoplasm is finely granular, is generally filled with plasma chlorophyll, serving as food and causing the green color of the body.

The mouth opening is placed at the anterior end of the body at some distance from it i.e. a little to the side of the pole. It leads into a tubular, contractile, slightly oesophagus, lying obliquely to the longitudinal axis and occupying two thirds the length of the body. The oesophagus is surrounded by long and highly refractive rods.

Near the contractile vacuole lie at posterior end of the body. The ovoid or cylindrical macronucleus lies generally at the posterior half of the body; behind it lies the spherical, homogenous micronucleus.

By its structure and especially by the position of the mouth and the arrangement of the oesophagus, Pelisphia reminds one of Prorodon but it differs from the latter only in the presence of the broad spiral furrow, leading from the anterior to the posterior end of the body.

Pelisphia is a very rare infusorian. It moves rather quickly, simultaneously rotating on its longitudinal axis and prefers the sides of the aquarium lighted by the sun. It feeds preeminently on the green Algae and green Flagellata, which also causes the green color of its body.

Single species:

1. Pelisphia ovum Stein.

Stein 1e;p.3e...22e;p.1ee.--Diesing 5e;p.e2e.

Kent 1e4;p.e11,pl.xvii fig. 1e...Entz.sr 2e;p.1e7e.

Levander 14e;p.7e-77,pl. iii fig. 33-35.

[illegible] forms to 0,035-0,050 mm long and 0,01 mm. broad.

[illegible] description.

Mit. Pros. Weiss et Kalopp.

Le. Grassia 1905.

Pl. II fig. 20-30.

Body long, vermiform, cylindrical, posterior end symmetrically rounded or more narrowed. Anterior either equally conically narrowed so that the body appears symmetrically pointed, or all at once extends into a thin cylindrical neck occupying in different specimens of one and the same species different lengths (from 1/11 to one fourth of the body.

The whole body is equally covered with very fine and delicate cilia. The cilia are arranged in longitudinal rows, extending equally from the anterior to the posterior end. The distance between the rows of cilia is sufficient for different species--in one species broader than in another. At the anterior end of the body are found moreover some large i.e. longer and thicker cilia. They are arranged either without any order in the form of a tuft, or in species having a neck, form the spiral lines placed more near one another than the longitudinal stripes of cilia covering the body. The first species has at the posterior end of the body some longer cilia forming a kind of tail.

The entoplasm is extremely ~~fine~~ thin and delicate and appears as a homogeneous layer. In it or under it lie (Ch. elongata) are the trichocysts, having individual shapes. They are not pointed at both ends like the majority of trichocysts but only at one end, having the appearance of spines ridden out at the end into a fine thread. These trichocysts are scattered without any order through the whole body, but gathered somewhat at the anterior end. The entoplasm is fine-grained and does not show any streaming.

The oral opening is placed at the anterior end of the body on the ventral side. It has the appearance of a longitudinal slit and becomes visible only at the time of taking food, when it is very much enlarged: the margin is often turned out so that the mouth becomes funnel-shaped, and the external appearance of the invagination is completely changed. There is no cytostome and the mouth opening leads directly into the entoplasm.

The anus lies at the posterior end of the body. Not far away is found the contractile vacuole [illegible] opening near it outwardly. At the time of digestion the vacuole often takes an entirely irregular form, as is also often observed in the long cylindrical forms having a contractile vacuole at the posterior end of the body. In Ch. Grassa instead of one there several (about 10) contractile vacuoles, arranged in a row along one side of the body.

The macronucleus consists of several nuclei scattered irregularly throughout the body in the entoplasm. Their number, size and shape are extremely variable: in some specimens there are from 5-10, while in others of the same species there are more than a 100. Special formations which might correspond to sphaeronuclei have not yet been observed either in the ordinary forms or in specimens found in conjugation or dividing.

Chaenia is found pre-eminently in salt water, at least two species (Ch. Teres and elongata) are, it appears, exclusively sea forms. Under the name Trachelius striatus Duj. (in Ehr.: p. 400, Pl. VII fig. 15) describes a fresh-water form entirely similar to this sea form Trachelius teres which equals Chaenia teres and therefore it is possible that this species is also found in fresh water. A third species, as yet little studied, Ch. crassa was found in fresh water. Chaenia prefers water rich in decaying matter, in which it multiplies with extraordinary rapidity. The body of Chaenia is to the highest degree mobile and contractile. They swim by means of small and fine cilia, taking their way by the anterior end straight ahead; the large cilia

of the anterior extremity of this flexible and fold back. The slow progressive motion is accompanied usually by rotation about the longitudinal axis of the body. On changing direction, Chaenia stops, lengthens then moves in the new direction.

The food consists exclusively of infusoria and algae. Chaenia is very voracious and often seizes prey as large as itself, when the mouth opens to prodigious dimensions. It has been observed that Chaenia, on seizing infusoria twice as large as itself, tries in vain to swallow it and after long, fruitless efforts, has been forced to leave its prey. Even again, Chaenia puts in motion the cilia found at the anterior end of the body and produces a vortex in the water which draws in the prey. Whether the prey be dead or alive in this way is not known, Chaenia springs on it impetuously, and seizes it, as it with lips, by the margins of the mouth which turned out. Another species (Ch. elongata), on having prey for itself, first throws out to it its trichocysts, which finding the prey kill it instantly and then in the way described above seizes the dead prey. Then Chaenia begins to make an oesophageal motion which Cunnington very justly likens to the oesophageal motion of the snake, and the prey which has been seized slips into the endoplasm, the mouth closes again and becomes invisible.

Multiplication occurs in the free swimming condition by means of cross-division and owing to the favorable conditions of existence (nutria water) it very rapid. Conjugation is also not rare.

Three species are distinguished

1. contractile vacuole at the posterior end of body
2. Anterior end of body uniformly pointed and furnished with a tuft of large cilia; longitudinal rows of cilia rather near one another. Ch. teres
3. At anterior end of body a neck with rather long cilia on it, arranged spirally; trichocysts; longitudinal stripes of cilia irregularly

19.

Pl. II fig. 8a.

...small and large forms from 0,07-0,...mm. long, and 0,...-0,...

...ssal.

...ly epicortical,at posterior terminal,at anterior drawn out i...
...ore or less spiralled horn. Small cilia arranged in longitudinal zones
...extending initially and broadly separated from one another,in number(8-10).
...In the mouth also spirally arranged the rows of large cilia.In the ento-
...plasm are triglenoidly jointed at one end. Mouth slitline,without oesopha-
...gus at anterior end. Anus and contractile vacuole at posterior end at only
...several (3-15?) be recognised.

...Hab. Surface area (Atlantic ocean and Mediterranean sea).

3. Strombidium Grasse Mem.

...Grassi 1879:p. ...-8,Pl.I fig.11.

Pl. II fig. 9a.

...very large form from 0,3-0,...mm. long.

...ody spheroidical or rather fusiform,enlarged in the middle,at the
...posterior end narrowed and drawn out into a long tail-like additional
...uniformly rounded at the anterior end. Small cilia cover the whole body;
...at the anterior end there are some longer cilia. Mouth slitline at the ant
...erior end.several (12) contractile vacuoles arranged in a row. Anus at
...posterior end ...ccis. Several macronuclei.

1 species as yet little studied.

...Hab. Fresh waters of New Zealand.

II.Family. Actinobolina Kent.

The family Actinobolina consists of only two genera,each of which
...has only one species.In their whole organisation representatives of this
...family are i to ...ard Holotrichina and especially Enchelyes,Lacrymaria oliva-
...ceus.They are distinguished from them only by the presence of special and
...peculiar organs, the so-called intermediate processes,consisting of two

[illegible] (straight or slightly curved) small, [illegible] contractile vacuoles [illegible] [illegible] of the ect. Three organs serve for inference (like [illegible]) for touch (like the tactile filiform). They are most [illegible] either simple(Ileonema) and are then placed at the anterior end of the body, or they are several of them(Actinolobus) and then they occur in rows along the ventral furrows,in the midst of tufts of cilia.

The body of Actinolobina presents a body of rotation and in form recalls to mind Loxocirrus or Lagynus. In the first case (Actinolobus) the body is ellipsoidal,greatly and uniformly rounded at both ends, or more narrowed at one end than at the other. In the other case (Ileonema), the anterior end of the body is drawn out into a rather long neck and then the body takes a bottle-like form.

The cilia are arranged along the longitudinal furrows,extending ventrally from the anterior to the posterior end. They are rather long, but fine and distributed uniformly and singly (Ileonema) or in tufts of [illegible] (Actinolobus).

[illegible] oral opening round,placed at the anterior end of the body. It leads into a thin walled, tubular oesophagus,surrounded by fine rods.

Anus and contractile vacuole placed at posterior end of body.

Nucleus spherical or ellipsoidal ,found in the middle of the body.

Sporocysts up to the present time not found with certainty.

The food of Actinolobina consists of algae or small Protozoa,chiefly of Flagellates and small Infusorians.

The family Actinolobina was established by Kent in 1881-2,on the basis of Actinolobus a genus discovered by Stein,which Stein referred to Loxodina. Bütschli looks upon Actinolobina as a sub-family of Loxodina referring to it also the genus discovered by Stokes,Ileonema.

Two genera are distinguished.

Rules for determining the genera of Actinolobina.

Ophryoglena.

1. Ophryoglena flava, cilia arranged in bands to longitudinal furrows; two cilia at apex of cell as antennae-like organs...1. Ophryoglena.

1. Ophryoglena flava, cilia arranged singly to longitudinal furrows; antennae and 1 cilia as antennae-like organs...2. Lionotus.

1. Ophryoglena flava Stein.

Fig. 1-3, Pl. 2-52.

The very contractile, in life hyaline condition elliptical to pyriform and usually somewhat depressed body is usually narrowed at the anterior end. The cilia are found in about the posterior end is more narrowed than the anterior. This not being the body is almost symmetrical, and occasionally the longitudinal axis is curved like the transverse axis.

The cilia are arranged with rather long cilia, not broad ciliated bands (cilia of the adult individuals), but in rows of 4-5 cilia in longitudinal furrows, extending ventrally from the anterior to the posterior end. The small opening found at the anterior end is surrounded by cilia rows usually closed, differing in no respect from those covering the body. The rows of cilia are at equal distances like one another, not very closely, so that along one cilia furrow 20 count about 12. The cilia furrows do not lie very closely together and are separated by ridges of hyaline protoplasm. In the middle of each tuft of cilia is placed the specific formation characterizing the genus Lionotus. This formation was called by former investigators an antenna, but the investigations of Butschli and Zelinger show that it has nothing in common with an antenna, but is a formation and organ which might more correctly be likened to the tactile hairs. These so-called antennae observed in a resting Lionotus is a distinct cylindrical to pear cylindrical to form, a slightly pointed rod. Their length is usually 1 1/2 times that of the body. In them three parts are distinguished: at the base a rather broad and short cylindrical part, and to it a very long, constantly narrowing cylindrical one at whose anter-

[illegible] at the anterior end of body; it is round [illegible] terminal or more entirely lateral aperture. The [illegible] of the stomach is surrounded by nine tentacular retractor muscles.

[illegible] anus is placed at the posterior end, diametrically opposite the [illegible]. and from it is found the contractile vesicle, opening [illegible] at the posterior end.

The ciliated ectoderm is present in the entire body. Myoepithelium and cuticle are certainly.

Lissema is a very rare Turbellarian and has been found up to the present time only once in America. It has as yet been very little studied and is of only a little interest. It is found in fresh waters and swims rather sluggishly by the anterior end also a short and rotating chain [illegible]. The body is very contractile and easily changes its form. The [illegible] ectoderm, evidently for protection but perhaps also as a tactile organ and is drawn within the body. From the hinder part of the organ is drawn to [illegible] attaches itself at first [illegible] the anterior end at its proximal part.

Single species.

1. [illegible] linear Stuart.

[illegible] 22: p.[illegible] Fig. 7.--[illegible]: p.146-147, Pl.IV fig. 2.

[illegible] 23: p.[illegible], Pl.VII fig. 4.

Pl.II fig. [illegible].

Form of series size about 0,15mm. long.

[illegible] described genus.

Hab. Fresh waters of America.

III. Family Coloscine Graveley.

The family Coloscina (at least some of its representatives) resembles very closely the related family Calamorpina and is distinguished from it chiefly by the constantly ciliated mouth opening. The body of some rep-

ventrally [illegible] ventral [illegible] of [illegible] without [illegible] ventrally [illegible] (Strombidium) or fully symmetrical. In the latter case one side dorsal cilia (dorsal), while the other (ventral) is flat [illegible] ventral.

[illegible] Coleps, with the exception of the genus Stephanopogon, are equally covered with cilia, arranged in longitudinal rows, extending terminally [illegible] the anterior to the posterior end. In Stephanopogon the cilia are arranged in three rows and do not cover all the body, but leave bare spaces on the dorsal and ventral sides here. Beside these usual cilia in all [illegible] there is found at the anterior end of the body a corona of small elastic, bristle-like cilia surrounding the mouth opening. In Stephanopogon, in place of several cilia, the corona consists of four triangular, undulating plastic lobes (formed by the union of separate cilia), enclosed at the base by a ringed membrane. The chief characteristic mark of the family Coleps consists in the presence of armour, consisting of a special organic substance. This armour does not occur in Plagiocoleps and in Stephanopogon, and in Tiarina consists of separate rods and in lobes of separate plastic lobes, arranged on the surface of the body in strictly definite order. These rods or plastic lobes are arranged in girdles, [illegible] a kind of latticed armour, through whose interstices look out the cilia. [illegible] Another characteristic of Coleps is the large, oblong or elliptical, [illegible] mouth, lying at the anterior end of the body, not in the middle of cases occupying it entirely. The mouth is prolonged usually [illegible] a more or less long, tubular and thin-walled neck.

[illegible] Less and contractile vacuole are always found at the posterior end, [illegible] opposite the mouth opening. In Coleps, the [illegible] shows [illegible] in that of a kind of rotation, the anus and contractile vacuole [illegible] constantly at the very posterior pole, while in bilaterally symmetrical forms they are removed to the side but in the same late vicinity of the post-

raptorial

[illegible] of elliptical, slightly pointed at the posterior end [illegible] straight at the anterior end. The whole body is densely covered with rather fine and short cilia. Cilia not very visible in preserved forms, extending from the anterior to the posterior end and arranged with somewhat ribbed stripes. The number of the ciliary furrows is very small (about 10 to 12) while the ribbed stripes are interlined and provided with broad meshings. At the anterior end of the body, about the cyto-pharynx, is found a coronal lobe-like part and not as long cilia, somewhat like tentacles.

The cyto-pharynx, having the shape of a broad low-shaped slit, is placed at the anterior end of the body. It is always wide and leads freely into the entoplasm; no special oesophagus is visible.

Food and contractile vacuoles are placed at the opposite end of the body. The nucleus is spherical and lies in the center of the body; the cytoplasm has and loses food with certainty.

The movements are usually quick and accompanied by rotations about the longitudinal axis of the body.

Multiplication is a rare occurrence and is found usually singly.

Its organization has been studied very little.

A single species.

1. Plagiocampa coloides Perty.

Stein 2[illegible]:p.50-52. Lent 134:p.508,Pl.XXVII,fig.7. Butschli [illegible]:p.[illegible].

Synon.:Holophrya coloes.Ehrenberg-63:p.102.-66:p.315,Pl.XXII fig.4.

Colepe inermis.Perty 184:p.158,Pl.VIII fig.4.

Dictyocolepe inermis. Diesing 50:p.555.

Pl.II fig.24.

Length forms from 0,07-0,08 mm. long.

The localities unknown.

Inhabits fresh waters of Europe.

6 small triangular plastic bodies,of which one (the smallest) is quadrangular, if the five remaining (of larger size) are triangular. On these plastic bodies are placed at their middlepoints in the form of teeth,reaching at times a remarkable size. Their number varies:C.hirtus and cyathiformis have 5 teeth,while in the latter they are of remarkable size,in C.hirtus they are of various sizes and are not found on all specimens;C. cucullulus has 4 teeth. At the anterior end of the body are also 15 (5+5+5) quadrangular plastic bodies,arranged semilunarly and surrounding the mouth opening like teeth.In C. cyathiformis,in addition to these small plastic rods,are seen about 6 teeth,arranged in pairs,but in C.cucullulus there are but rather long teeth,lent each line appearance. All these plastic bodies as well as the teeth,consist of a light and transparent,rather organic matter.

The cilia are arranged in longitudinal rows and reach out through the openings ,formed by the scallops of the plastic bodies of the armour,so that in each scallop there is situated one cilia.While the number of longitudinal rows of plastic bodies (15),as well as the number of scallops in each row (15) is insignificant,,if the number of cilia covering the body of Codonella is as nothing in comparison with other infusoria. The cilia are fine,threadline and rather long. In addition to these cilia,at the anterior end of the body is found also a corona of cilia somewhat shorter, but thicker,like bristles and surrounding the mouth opening. According to the investigations of Entz they are united at the base by a fine membrane, to which,neither Maupas nor I can certify.

The entoplasm consists of a very fine and homogeneous layer,lying immediately under the plastic armour. One can only be convinced of its existence in specimens almost very full ,in which on account of the semi-fluid the plastic armour is parted between its bodies;resulting also interstices,it is possible to see a fine membrane,surrounding the body with all sides. The entoplasm is like-plasma and contains besides food

running after it,

[illegible]

[illegible]

[illegible]

Pl.II fig. 33.

Pl.II fig. 37.

undulating

undulating

undulates

thin

undulating

undulating

undulating

undulating

undulating

y

ded

s

striped

thin

undulate

[illegible] Phacotus [illegible]

[illegible] Pl.III fig.7.

[illegible] Pl.III fig.10.

" " " fig.15.

Pl.III fig.16.

[illegible] 0,37-0,1 mm. long and 0,03-0,045 mm. broad.

[illegible]

[illegible]

2.Dictyosphaerium Ehrb.

Pl.II fig.38-40. Pl.III fig. 1-3.

[illegible] usually rounded at posterior end, or sometimes obtusely truncate; in the latter case it resembles one of a [illegible]. The anterior end is cut off straight and passes into a protruding beak or cone, crowned at the base and provided with a cleft open[illegible]. The cell is not contractile and can therefore change its shape in consequence of which its posterior end may seem blunt or narrow, and the anterior cleft may be pulled in or protrude out, appearing now as a [illegible] cleft, and now as a rather roomy [illegible].

undulating

d

Chlamydomonas

Chlamydomonas

symbiotically.

d

c

k

undulating

undulating

ly, into the materials. In B. Angle the wavelength is expressed in the
[illegible] Thus the ratio of the wavelength.
[illegible] of the [illegible] at a
[illegible] the [illegible] wavelength.

[illegible] is closer to the material half of the [illegible] the ratio. It is [illegible] B. shows the position of [illegible] for [illegible] can't be found with certainty if [illegible] wavelength.

[illegible] wavelength was [illegible]. With the help of [illegible] modulating [illegible] lies if [illegible] very [illegible] and [illegible] slightly as [illegible], rotating instantly about its instantaneous [illegible]. It [illegible] for more than one [illegible] instantaneous [illegible] at one time different [illegible] of [illegible] lines. These [illegible] [illegible] [illegible]

undulating

undulating

undulating

about

(left) of the flattened side of the body.

Related to the form of the body i.e. to the degree of flattening, is the ciliary covering of representatives of different genera. While in Amphileptus we met still with the primitive condition i.e. the cilia cover all the body and are placed in furrows, arranged meridionally and extend to the ventral side at an acute angle to the slitline mouth opening; in Loxophyllum these cilia areas are still met and covered with cilia, yet the ciliary covering of the two sides is different, e.g. on one (right) side the cilia are longer and more laterally set (more ciliary furrows) than on the other (left) in which they are shorter, like bristles and less closely set in fewer ciliary furrows. Finally in Lionotus and Loxophyllum the cilia cover only one (right), entirely flat side of the body, on which the infusorian usually moves and which therefore was mistakenly called by former authors the ventral side. The opposite (left) side of these genera in Amphileptus is indeed entirely bare, although in Lionotus there are some longitudinal furrows. Beside the cilia described we find in a majority of the Amphileptina at the anterior end of the body one row of larger or equal in size but very much thicker cilia, which were called justly the mane (crinière) by Gruber. In Amphileptus this mane or crest is along the right margin of the body and consists of cilia, not differing from the cilia which cover the body, but placed nearer each other. In Lionotus the crest is along the left margin of the mouth slitand consists of more or less long and thick cilia protruding to different degrees in different species. In Loxophyllum and Loxodes there is no special crest, but in the latter along the right margin of the peristome is placed one row of large and thickly set cilia.

The entoplasm is in a majority of the Amphileptina a fine homogenous layer and only in a very few representatives (genus Lionotus) does it consist of an alveolar layer and a very fine external pellicle. The entoplasm is fine grained and in Loxodes has a very characteristic structure. Beside

[illegible] there is seen a transparent, [illegible] so-called [illegible], [illegible] in the anterior and posterior end of the body (Linotus) or surrounding the [illegible] on all sides (Loxocyllium) and forming the so-called marginal [illegible].

The mouth opening, i.e. form and location are extremely characteristic for [illegible]. In all representatives of this family it is elliptical and with the exception of Loxodes is seen only at the time of taking food. In Chilodon it occupies all the anterior of the oblique cut end of the body, flattened from two sides only at the constriction of the mouth slit. In the remaining genera the flattening extends along the whole body, and we get a flat, ribbon-like or plastic body, in which the mouth slit occupies the anterior part of the ventral side, appearing in the shape of a facet or ribbon. While the anterior end of the body is usually bent to one side, one margin or rib appears at the anterior end convex, and the other, opposite margin - concave. In Linotus and Loxocyllum the mouth opening is placed on the convex ventral margin, and in Loxodes - on the concave. In some species of Linotus and in Loxodes the mouth slit lies in the hollow of a longitudinal furrow - the so-called peristome. With the exception of Loxodes there is no oesophagus.

Trichocysts occur in all genera, except Loxodes. They are either scattered throughout all the body, or arranged in rows along all or some part of the outline of the body, or, finally, arranged in a row along the right margin of the mouth slit.

The anus is found at the posterior end, immediately at the pole or not far from it on the ventral or dorsal face.

The contractile vacuole if there is one, is placed at the posterior end. If there are several, they are either arranged throughout the body (Chilodon) , or in a row along the ventral (Linotus) or dorsal (Loxocyllum) margin.

The macronucleus is an extremely variable form: in a majority of rep-

...ectively it consists of two spherical or ellipsoidal lobes, united by a tape-like strand; in others the macronucleus is ellipsoidal or rilliform, thirdly it consists of four lobes and finally moniliform are found in which the macronucleus is not united. The micronucleus (one or even several) usually lies close to the macronucleus.

The food of Amphileptina consists almost exclusively of small or even very large infusorians;-they are typical carnivorous present very voracious. Division takes place in the free swimming or encysted state. When conjugating they attach by the mouth openings.

The family Amphileptina was established in 1851-52 by Stein, as a sub family of Trachelina. He referred to this sub-family the genera: Amphileptus, Lionotus, Loxophyllus, Trachelius and Dileptus, dividing the genus Loxodes in the sub-family Loxodina, referring it also to the family Trachelina. On the basis of the common traits in organization (trans out is long and flattened on the sides, the long slitlike mouth, the reduction of the oral covering) I regard it as fitting to unite Amphileptus, Lionotus, Loxophyllus and Loxodes into one family assigning Trachelius and Dileptus to another family - Trachelina. The above-mentioned four representatives of the family of Amphileptina former investigators (Ehrenberg, Perty, Claparede and Lachmann, Stein, Diesing) referred to the family Trachelina, while Wrzesniowski to the families Trachelina, Loxodina and Paramecina. Some referred some of the Amphileptina (Amphileptus and Loxophyllum) to Trachelina, and others (Loxodes and Lionotus) to the division Gymnotricha.

Four genera are distinguished:

Table for determining the genera of Amphileptina.

1. Body flattened little or only at anterior end (at the entrance of the mouth slit); the whole body equally covered with cilia, arranged in longitudinal furrows... 1. Amphileptus.

1. Body flattened rather strongly at the sides, rilliplike or elastic; cilia on only one side, if on both- then of different length and form.

2. Slitline [illegible] opening at posterior end of convex ventral margin; no [illegible].

3. Body elongate-oval, depressed in the middle, with a more [illegible] drawn out or bent in the shape of the letter "J"; more or less [illegible] crest or cilia along left margin of mouth slit.

2. Libinotus.

3. Body flat, elastic; no crest..... 3. Loxodes.

2. Slitline mouth opening in the notch of the peristome at anterior end of convex ventral margin; small tubular oesophagus.

4. Loxodes.

1. Loxodes Duj.

Pl.II figs.45-46.

Body oblong-cylindrical, a little narrowed and equally rounded at the posterior end or drawn out into a tail-like process (L.caudatus), furnished at the end with a small indentation serving for [illegible] the fine [illegible] attached to it. The anterior end of the body is gradually narrowed and is either obliquely cut (L.cuspidatus) or bent a little to the left side of the body (L.inclinatus). The anterior end of the body is a little flattened at the cut-off spot; for as also the whole body is not cylindrical, but also flattened somewhat at the sides. In general the body is not a body of rotation, as in the majority of the representatives of Prostomata, but appears bilaterally symmetrical.

The whole body is covered with rather long, very fine and soft cilia, arranged in longitudinal rows in shallow furrows. These furrows extend uniformly from the anterior to the posterior end. On the ventral side, at the very place, where the mouth slit is placed, i.e. in the middle, the longitudinal ciliary furrows do not reach to the anterior pole, but only to the margin of the slitline mouth and join there with the furrows of the other half of the body, forming a more or less acute angle. In L. inclinatus as in addition to this at the anterior end of the body is found a special crest, which consists of cilia, not differ ent from the cilia covering

the [illegible] arrangement becomes more thick. This crest extends along the right margin of the body occupying all its anterior third, it reaches to the pore and passes to the left side, covering only insignificantly its anterior end.

The entoplasm consists of a rather thin, transparent and homogeneous layer. In L. vibrio itself in this layer immediately under the longitudinal ciliary furrows, lie fine myonemes filiform myonemes, causing the shortening of the body. Besides this in the ectoplasm of some forms are found trichocysts, which are grouped at the anterior end: so in L. carcassii trichocysts are met with in inconsiderable numbers and are arranged without essential order along the mouth slit, while in L. incurvatus they are arranged at the anterior end in one row on the left side of the mouth. The entoplasm is fine grained and contains besides food granules many others highly refractive of light.

The mouth opening in the form of a long, usually closed, slit is found on the lateral (ventral) side at the anterior end of the body, it either occupies all the obliquely cut part (L. carcassii and L. [illegible]) or in the shape of a short cross lies on the ventral side of the anterior end. Usually the mouth is short and then is hardly visible - at the time of seizing prey it enlarges much and protrudes considerably. There is no oesophagus.

The anus is found at the posterior end. The contractile vacuole is one (L. incurvatus) and then lies not far from the anus, or if several they are arranged without any order throughout the body.

The macronucleus is ellipsoidal or consists of two or four oval arms joined in a row by a fine connection. The macronucleus has been found with the exception only in L. incurvatus and appears as one or two spherical bodies highly refractive of light.

L. incurvatus occurs in salt and fresh water. Its movements are usually slow and often accompanied by rotation about the longitudinal axis. Swimming slowly and rhythmically amid the algae or tree-like colonies of Vor-

ticellidina (Carchesium and species of Epistylis), it constantly turns its apical anterior end in different directions, as if feeling the surrounding objects.

Amphileptus is a typical carnivour and feeds especially on ciliated Infusoria. A. incurvatus usually leaves suddenly upon its prey, paralizes its movements by a discharge of its trichocysts, found near its mouth opening, and then gradually swallows the dead prey. Even swallowing the prey the slitlike mouth opens widely and then it is not difficult to be convinced of the absence of a special oesophagus. Other species of Amphileptus (A. carchesii and claparedii) feed almost exclusively on sessile, colonial infusorians, giving special preference to the genera: Carchesium, Epistylis and Zoothamnium. Feeding on the dendroid colonies of these Vorticellidinae, the voracious Amphileptus feeds the anterior part of its body in different directions, as if feeling and seeking after passing prey. Whenever Amphileptus comes in contact with Vorticellidina, the latter contracts, pulls in its peristome, and takes a spherical form. Amphileptus attaches to it by its ventral side, opens widely its long slitlike mouth and at once seizes its prey. Having swallowed the food which often is not less than the devourer in size, Amphileptus does not leave the stalk on which sat the individual colony, and taking a more or less spherical shape, throws out on its surface a fine envelope, i.e. encysts. In such an encysted state Amphileptus quietly digests the swallowed prey, and then, coming from its cyst, it again continues its devastating attacks on the individual colonies. This very interesting biological phenomenon was observed in the 'Sties at the time of the putting forth of the theory of [illegible] by Steinem and fully verified by Gruber in a new demonstration in favor of the theory of the alternation of generations of infusorians, until the observations of Claparede and Lachmann served to unveil the meaning of this phenomenon.

Multiplication, consisting of cross division, occurs either in the free-swimming (A. incurvatus) or in the encysted (A. carchesii and claparedii)

condition.In the latter case it often takes place that only after the
[illegible] of [illegible],i.e.when [illegible] on the [illegible] of the [illegible]-
ei [illegible].

Three species are distinguished:

1. [illegible] only on ventral side;several cont.vac.

2. [illegible] of the arms,posterior end of body equally rounded.

A. claparedii.

2. [illegible] of 4 arms; at posterior end of body [illegible]tation;
at anterior end of body 8-12 trichocysts. A. carnesii.

1. Anterior end bent to left side,one cont.vac.at posterior end of body.

A. incurvatus.

A. [illegible]claparedii Stein.

Stein [illegible]:p.134 [illegible]nta 30:p.320-323,Pl.[illegible] fig.14-16.

[illegible]li [illegible]:p.1[illegible]-1,Pl.LII fig.2. Hellinger 53:p.245.

Synon.:A. [illegible]. Claparede and Lachmann 58:p.553-555.Vol.II p.159-
160.Pl.VIII fig. 1-11.

" [illegible]ent 154;p.523,Pl.[illegible]VII fig.45-45.

" Kellicott 151;p.334.

A.sp.[illegible]mann 741 p.279-280,Pl.[illegible]XII fig.9-10.-79;p.371.

A.to [illegible]nostomum elegans.d'Udekem 251;p.5.

?Trachelius [illegible]. Chenier 53;p.321,Pl.[illegible]III fig.3

" sp.Clemacamy 37;p.34-35.

Coelina sp.d'Udekem 255;p.5-10,fig.5-9.

Pl.II fig.45.

Small forms from 0,12-0,15 mm.long.

Body pyriform,[illegible]ally rounded at the posterior and narrowed at anterior end. Anterior end cut obli[illegible]el, on ventral side and a little flattened at the sides. Mouth slit-like,visible only at the time of taking food,occupies all the anterior obli[illegible]ely cut end;no oesophagus. Anus at posterior end. Several contractile vacuoles arranged throughout the body. The ma-

[illegible] consists of two oval tubes, united [illegible] t[illegible]

[illegible]. [illegible] seas of Europe and America; [illegible] seas.

2. [illegible] carcassii Stein.

[illegible] 60:p.103-104. Cole 40:p.33-43.

A little slender form.

Body oblong-cylindrical, rounded at the posterior and gradually narrowed at the anterior end. At the posterior end is found a small volute [illegible] by means of which A.carcassii attaches to the stalks of the colonies of Vorticellidine. Interior end obliquely cut on the ventral side and a little flattened at the sides. Mouth slitlike, visible only at the time of taking food, situated on the obliquely cut anterior end; one [illegible]us. At the anterior end, at the side of the mouth [illegible] several (5-12) trichocysts. Several contractile vacuoles scattered throughout the body. The macronucleus consists of 4 ellipsoidal parts united by threadlike [illegible]. Micronucleus not known.

Hab. Fresh waters of Europe and America.

3. Lacrymaria curvata Duj.sp.

[illegible]ff 1[illegible]:p.3[illegible].

Synon.: Loxoneria incurvata .Dujardin 57:p.402,Pl.XI fig.4.

" " [illegible]s 157:p.513-516,Pl.XX figs.28-30.

Pl.II fig.45.

[illegible] very small to entire size from 0,[illegible]-0,15 mm. long.

Body oblong-cylindrical, narrowed at both ends (at anterior somewhat) and rounded. Anterior end somewhat bent to left side. Ventral side a little flattened at anterior end. Mouth slitlike at anterior end on ventral ~~anterior~~ side, visible only at time of taking food; one contractile vacuole. Along the anterior third of the body is drawn on the right side one row of lateral [illegible]a-

type cells, forming the so-called crest. This crest extends to the anterior body end and passes to the left side, reaching its insignificant anterior end. On the left side of the body one row of trichocysts, anus and contractile vacuole at posterior end. The ellipsoidal macronucleus (according to others it consists of two parts) is found in the posterior half of the body. Micronucleus one or two.

Hab. Barentsz seas and fresh waters of Danish islands.

2. Lionotus fusus.

Pl.II fig.47-53, Pl.III fig.64, Pl.VI fig.103, Pl.VII fig.173 and 187.

Body spindle-like or lancetlike, flattened not in a sagittal, but in a frontal plane of the body. At the anterior end of the body there is a more or less long, slightly bent, like a sword, process with pointed and sometimes enlarged end, which in many species is bent toward the dorsal side. Length and shape of neck very variable in different species: in L.fasciola neck very long and very rarely separated from the trunk, while in L.fasciola, rostis, discolorus and others it is shorter and gradually expressing passes into the body; and in L. parvinucleis, pictus and lamella it is short and hardly visible.

The body is flattened on one side and inflated on the other, forming a kind of keel, whose height depends on the amount of food taken in. The posterior end of the body is drawn out in a more or less long, conical, slightly bent to the side tail (L.caudatus), ~~short~~ which in some species (L.fasciola and L.lamella) bent in an opposite way form the bend in the anterior end. In the remaining species the posterior end of the body narrowes insignificantly and is equally rounded. Along all the convex side of the anterior end of the body, i.e. the neck is placed longitudinal furrow, in whose hollow is found the slitlike mouth opening. Calling this side of the body on which is placed the mouth opening - the ventral and orienting all the body in it so that in Lionotus a flattened right side (on which it moves and which therefore former autors called the ventral side erroneously) a convex left

(dorsal) and ventral and dorsal sides pre-
sented in the shape of a ventral, convex rib.

...al, on the right (left) side of the body and the ventral rib are cover-
ed with very fine and short cilia. Along the left (dorsal) margin of the
ventral rib there is a row of longer and thicker cilia, which are very justly na-
med by Sajerlin the crest (crinière). These cilia sit on special out-
growths - papillae, giving the left margin of the ventral rib a somewhat hilly
appearance. Such a crest is not present with definiteness in all species:
thus in L. crassicornis and pictus it is almost invisible. The left (ven-
tral) side of the body, on which the dorsal rib are entirely without cilia and
papillae. The cilia, placed on the right side of the body, are arranged in
longitudinal furrows, set more or less near one another: so for example L.
labellum has 3 ciliary furrows, and L. fasciola 7-8, and L. gracilis and pictus
many ciliary furrows. In these extremely narrow longitudinal furrows, pre-
sent with definiteness only in hungry specimens, the cilia sit on small pa-
pillae. The left (ventral) side of the body appears either entirely bare, or is
provided with several (4-6) deeper longitudinal furrows, in which there are
neither cilia nor papillae. All the ciliary furrows extend from the post-
erior end of the body reaching to the middle of the trunk, and passing at an
acute angle to both margins of the oral slit or peristome.

The ecto-plasm appears in some species in the form of a fine, homo-
geneous and, it would seem, structureless layer, while in others it consists of
an extremely fine external cellular and a rather thin alveolar layer. The
entoplasm is granular and is found in the majority of species only in the
middle of the body, and only in a few (L. crassicornis, labiatus and obtusus)
does it reach close to the posterior end. The space between the ecto- and
entoplasm is full of a crystaline and transparent, not granular, proto-
plasm, the so-called corticle layer, which is present with special definite-
ness in neck and tail. Since there is very great diversity of form in these
so closely connected parts, met with especially in parts of the body of those

[illegible] special cases of contractility (i.e. in the anus), the cortical plate in all probability furthers the contractility of the whole body or a certain part of it.

The oral groove is placed in the ventral furrow, immediately at its right ventral end and has a long slit, occupying almost all the length of the furrow. Usually the mouth is closed and hardly visible; it becomes visible only at the moment of taking food. There is no special cytostomal us.

Along the right (ventral) margin of the furrow and perpendicular to it, there is placed in the majority of species (L.folium, fasicola, oltusus, servaviensis, and gracilis) one row of rather large trichocysts. Most trichocysts appear in the form of short and thick rods, arranged parallel to one another, and when falling out are ~~either~~ or for protection, throw them out. In L.servaviensis the trichocysts lie somewhat irregularly, and in L. fasicola they are found at the posterior end of the body/scattered irregularly. In L.flavicans the trichocysts are scattered irregularly in all the body and appear in the shape of long, thin rods. L.lamella and gracilis have no trichocysts.

The anus is found at the posterior end of the body and lies in forms having a tail-like process full of cortical plasma (L.folium, fasicola), or the ventral rib. In other species with rounded posterior end without cortical plasma (L.servaviensis and oltusus) the anus lies at the very pole

The number of contractile vacuoles differs in different species. In some (L.folium, fasicola, lamellaut. lictus) only one is found and they it lies at the posterior end not far from the anus. It opens outwardly on the frontal rib. In L.oltusus there are two contractile vacuoles, one of them lies at the posterior end, and the other at the base of the neck - both vacuoles open outwardly in the ventral rib. In the remaining species there are several (5-6) contractile vacuoles, arranged in a row along the ventral rib of the body and opening outwardly; so in L. servaviensis there are 6,

. .

and it L. [illegible] contractile vacuoles. In L. [illegible] (4-6) contractile vacuoles,arranged along the ventral side,there is one [illegible] of the pellicles and of the body.

[illegible] lies in the posterior half of the body,usually near the right (first) line of the ventral silk. In the majority of species it consists of two ovoidal (L. [illegible]) or ellipsoidal (L. [illegible]) links,united by a short (L.lesicole) or long (L. [illegible]) threadlike strand. Each one of these links lies usually the [illegible] and homogeneous spheroidal. The strand,uniting the links of the [illegible],are often clearly with certainty only in stained nuclei and it could seem, consist of the same material,as the substance of the nucleus, i. . it possesses like peculiarities with it,and is not sharply with colorable matter.The first nucleus has a fine cellular structure an contains some larger ,highly refractive and intensely colored granules.In L. [illegible] there is observed in the links a special partition. Some exceptions to the common type of structure of the nucleus of Lionotus appear in two species - L.lamella and L.pictus. The first species has one elongated-ellipsoidal macronucleus with rounded or pointed ends,provided with a hollow at which is placed the micronucleus - it recalls to a certain degree the form and structure of the nucleus of Paramecium aurelia and caudatum. L.pictus has several nuclei,differing in form and size,scattered through the protoplasm.

The genus Lionotus occurs in soil and fresh water,though some species [illegible] exclusively in salt(L. granulis and pictus) or in fresh (L. [illegible],diaphanosoma colusus),while others are found both in salt and fresh water. Some species are very common (L.fasciola),while others are very rare. They occur on the surface of the water,amongst algae and other water plants. Many species prefer decaying vegetable matter,in which they multiply rather rapidly.

The body of the majority of species is colorless. Only L.

picles

is colored orange color; the coloring of the body depends on the diffusion of colored substances, and also on the presence of special pigment (orange) cells, arranged in the ectoplasm in longitudinal rows. The body is elastic, and has been in the majority of species is in two highest degree

supple

and contractile. The movements of Lionotus are not especially quick; at first after it can swim rather quickly in clear water. Amid algae it slides, constantly bending, sometimes its anterior end and continually turns its body from one side to the other. There is no definite notion about the longitudinal axis, but Lionotus often changes from side to side, directing attention then to the different sides of the body. It is found in constant motion and never stops quietly in one spot. With the help of the short cilia placed on the flattened, right side of the body, it creeps among the algae or clings to its thin filamentous trichocysts, but does this rather rarely.

Lionotus is a very voracious and dangerous rotifer. It feeds on small Infusorians, for example, Cyclidium, Dileptus and others, but it attacks also large Infusorians. In seizing prey it is extraordinarily quick and the proboscis is pushed out a few seconds. With some patience it is possible to follow this interesting process especially in hungry specimens, to which food is given in large amount. Once Lionotus reaches an attack on an Infusorian for a moment it pauses and then with the quick turn of lightning seizes the prey. Then the mouth slit is much enlarged in all its length, so that the body is drawn into it as into a bag, after which the mouth closes. At the time of seizing and swallowing prey the cilia of the so-called crest, situated along the left margin of the funnel (peristome) beat in the direction from the mouth opening and give rise to a strong current, which causes the rotating of the food. Often at the spot where the body of Infusorian is touched by the proboscis of Lionotus, the latter retains some extruded trichocysts. This circumstance compels the conclusion that the trichocysts at the seizing of prey play the role of organs of attack and for paralyzing movements. Lionotus is seldom satisfied with one victim, but continues the search farther and swallows usually several

[illegible] been [illegible] is a short time.

[illegible] ed [illegible] animal there too[illegible] interest. Earliest of all cilia and bristles van-[illegible]ish, then the longitudinal striping and entoplasm became cloudy and the [illegible] last little by little in a mass in which only the nucleus was [illegible]. With the constant and gradual increase of the food vacuole, [illegible] lost more and more, and finally lost any resemblance to an infusorian. Soon after the nucleus [illegible] of food were carried through the anus.

[illegible] division, accomplished by cross division, takes place in the majority of cases in the free swimming condition. Only in a few species does [illegible] occur in cysts. Such cysts are spherical and surrounded by a thin envelope in distinction from the resting cyst, which has a thick envelope. Then conjugating individuals attach by mouth openings and are [illegible] along all the mouth furrow.

Eight species are distinguished:

1. [illegible] at posterior end of body.

2. [illegible] nucleus

3. [illegible] consists of cilia united by a strand: two or three-[illegible] cysts

4. Flat and very long, one... L. folium

4. [illegible] at middle of its length bent to dorsal side. L. [illegible]

3. [illegible] nucleus with spasmoneme lying in its bottom, no trichocysts. L. [illegible]ella.

2. [illegible] L.pictus.

1. [illegible] L. [illegible].

1. [illegible]

2. [illegible]

3. 5 contractile vacuoles:triangular at anterior end of body;nucleus of two spherical rings,no distinct crest.

L.[illegible]

3. 5 contractile vacuoles;triangular radiate,through all the body;nucleus of two oval rings;distinct crest.

L. [illegible].

2. [illegible] small contractile vacuoles along ventral rii 1 large contractile vacuole at posterior end of body;nucleus of two spherical rings. L. grandis.

1. Lionotus folium Duj.sp.

[illegible]:p.487-500,Pl.XIII fig.26-28.

[illegible]:L.anser.mutschli 23;p.1691,Pl.LIX,fig.5.

[illegible]ruber 119:p.523,Pl.x,fig.54.

L.[illegible]nt 134:p.742-745,Pl.xLII,fig.12-13.

Dileptus folium Dujardin 37;p.409,Pl.I,fig.3.

Pl.II fig.47-49.

Large and very big forms from 1,05-3,4 mm. long.

Body elongate-lanceolate,narrowed at anterior end and passing into a long proboscis inflected at the side,somewhat enlarged at the anterior end. Posterior end of the body conically narrowed and forms a straight tail. Left side of body (ventral,oft exhibited and forming a hood. Mouth slit [illegible] in hollow or furrow,occupying whole length of neck. Along the left margin of furrow is placed a crest of cilia,and along the right,one row of trichocysts. Cilia arranged in longitudinal furrows on the right side of body. Cortical plasma at the anterior and posterior end of the body. Anus and

[illegible] contractile [illegible] posterior end of body. [illegible] two [illegible] a stroma.

[illegible] Vibrio of Brieger and Hafkine 1894.

2. Vibrio fasciola Zimmer. 3.

[illegible] : .73 (Asiatic) and 1891: .(Litoratus) p.[illegible]-[illegible],Pl.[illegible]-[illegible],fig.28-34.

[illegible]ent 1894: .743-744,Pl.LII,fig.5-11. [illegible]utz 73: .38-40,Pl.VIII,fig.3-5.

[illegible] 3: .1891,Pl.LIX,fig.8.

[illegible]ol 1[illegible]: .1-[illegible],Pl.II,fig.[illegible]-30.--[illegible]: p.38. [illegible]ll 1[illegible]: p.38.

[illegible].: Vibrio fasciola .O.F.Muller 1773: p.68-70,Pl.IX,fig.13-20.

[illegible] Vibrio fasciola. Metchnikoff 88: [illegible], Pl. [illegible]III,fig.1.

" " Dujardin 87: .435,Pl.I,fig.17.

" " Pfeiffer 1894: p.161.

" " Zeitler 25: p.110-132.

" " Zimmerman 42: .434-436,Pl.LIII,fig.5-7.

" " Lachmann 1853: p.355,Pl.III,fig.12.

" " Finkler 1885: p.24,34,37,113 and 116.

" " Diesing 50: .845.

" " Schmarda 2[illegible]: .[illegible].

" " Stokes 223: p.215-245.--245: p.[illegible].

" Vibrio fasciola. Bouriet and Straker 1[illegible]: p.471-472, Pl.[illegible]X,fig.2-3.

[illegible] Vibrio fasciola Clement 1[illegible]: p.[illegible],Pl.[illegible]III fig.[illegible].

[illegible] Vibrio fasciola. Klein and Lachmann 1[illegible]: p.351-352.

" " Stokes 1[illegible]: .243.-1[illegible]: .273-284,Pl. VI,fig.[illegible]

" Vibrio [illegible]. [illegible] 1[illegible]: p.[illegible],Pl.[illegible],fig.1-4.

" " van Ees 1[illegible]: p.8-10,Pl.VI,fig.2.

" " Kolmsma 5: p.[illegible]-[illegible],Pl.II,fig.14.

Trichomitus fasciola. Zimmerman 94: .54,55.

Litorina tri[illegible] Linné 1[illegible]:p.[illegible],Pl.III,fig.17.-1[illegible]:p.[illegible],
Pl.II,fig.14.

" [illegible]. Stone 1[illegible]:p.324,Pl.III,fig.16.-1[illegible]:p.[illegible],
Pl.II,fig.15.

Pl.II,figs.43-50,Pl.VI,figs.153,Pl.VII,figs.173 and 197.

[illegible] diam. also from 0,35-0,41 mm. long and 0,17-0,22 mm. broad.

[illegible] somewhat like the [illegible] of the letter "S". A trivial and great [illegible] passes into a rather [illegible], set to the dorsal axis; anterior end [illegible] to the ventral side. [illegible] slit in a hollow of the [illegible] at the anterior end of the [illegible]. Also the left margin [illegible] bears [illegible] chief of cilia, and also the right one row of the [illegible]; [illegible] [illegible] only several irregularly scattered. The [illegible] [illegible] in 7-8 longitudinal furrows on the right side of the [illegible]. Cuticle passes at anterior and posterior ends. Anal and contractile [illegible] at anterior end of body. Chromosomes consist of two oval limbs [illegible] by a short strand. Spermatozoon spherical.

Lei. From coasts of all parts of the earth and Barrents Sea.

5. Lironotus tenella [illegible].

[illegible]:Helgola [illegible]. Müller 1[illegible]:p.[illegible],Pl.III,fig.1-5.

[illegible]:Cochlea tenella. Linné 1[illegible]:p.17.-[illegible];p.54,56,65x70.-[illegible];p.107.

[illegible]:p.[illegible],Pl.[illegible]III,fig.3.-[illegible];p.477.

" " [illegible]:p.181.

" " [illegible]:p.[illegible].

" " [illegible]:p.24.

" [illegible] [illegible]:p.[illegible],Pl.VI,fig.3,[illegible] 17.

" [illegible] " [illegible]:p.151.

" " [illegible]:p.542.

[illegible] tenella. [illegible]:p.[illegible]—547.

Lironotus tenella. [illegible] and Leuckart 3[illegible]:p.[illegible]-[illegible].

[illegible] 1894: [illegible].

" " [illegible] 1903: [illegible].

" " [illegible] 6;p.225,Pl.II,fig.15 .

Pl.II fig.21.

Size of [illegible] 0,37-0,39 mm.long and 0,21-0,23 mm.broad; [illegible] very small ones about 0,14 mm.long,and also very large ones,attaining 0,225 mm. in length.

[illegible] gradually narrowing towards the anterior end,which leans to the dorsal side,and equally rounded at the posterior end. Mouth slit at the anterior end of the ventral rib in the hollow of the furrow. Along the left margin of the latter are attached a crest of cilia. No trichocysts. Cilia arranged in 3 longitudinal rows on the right side of the body. Contractile vacuole only at anterior end of body. Anus and contractile vacuole at posterior end. Macronucleus cylindrical with rounded or pointed ends. Numerous spherical lies in hollow of macronucleus.

Hab. Fresh waters of Europe,Asia and Africa & Eurasian seas.

4. Liomotus pictus Kiul.

Kiuler 11b:p.521-523,Pl.I,fig.52-55.

Very large forms about 0,5 mm.long.

Body lanceolate,much flattened at the sides;anterior end narrowed gradually and slightly bent to the dorsal side; posterior end equally rounded. Mouth slit (small) on anterior end of ventral rib;along the left margin of the furrow is hardly visible a crest of cilia;no trichocysts. Cilia arranged in longitudinal rows close together on right side of body.Anus and contractile vacuole at posterior end. Several spherical and ellipsoidal nuclei scattered in the protoplasm. Body green color.

Hab. Mediterranean Sea.

5.Liomotus obtusus Kiuj.

Synon.: Loxophyllum obtusum Kiuj 1894:p.242-243.-1894:p.214-[illegible] XVI

fig. 11-14.

[illegible] Lauterborn 1913 :395,Pl. II fig.12.

[illegible] from 0,165-0,3 mm.long.

[illegible] rounded at both ends (at anterior more than at posterior) and kept at the anterior to the dorsal side;posterior end e[illegible]ly rounded. [illegible] with cilia in a furrow, lying at the anterior end of the ventral [illegible]; along the left margin of the furrow is [illegible] crest of cilia. On the right (dratted)side of the body [illegible] longitudinal row of cilia. Cortical [illegible] at anterior end.[illegible] at posterior end. Two contractile vacuoles at the posterior end of the body,the other on the ventral [illegible] at the base of the [illegible],i.e.in the middle of the body.The [illegible] consists of two ellipsoidal [illegible],united by a short [illegible];near it lies a spherical [illegible].

Hab. Fresh waters of Europe and Africa.

[illegible] Lionotus varsoviensis Wrzesn.

[illegible]ai 1[illegible]:p.502,Pl.XXIII,fig.35. Kent 1[illegible]:p.744-745,Pl.XLII,fig.4.

[illegible]l.II fig.62.

[illegible] of medium size about 0,1 mm.long.

[illegible], elongate, equally rounded at posterior end and [illegible] out into a [illegible] of inconsiderable length at anterior end; anterior [illegible] a little bent to dorsal side. [illegible] cilia at anterior end on ventral [illegible], motion of [illegible]. Along the left margin of furrow a crest of cilia [illegible] visible; along its right margin a row of trichocysts. Cilia arranged in longitudinal rows,first separated from one another on the right side of the body. Cortical plasma at anterior end [illegible] cilia. [illegible] at posterior pole. Five contractile vacuoles,arranged in a row along the ventral [illegible] of the body. [illegible] consists of two spherical [illegible],united by a short strand.

Hab. Fresh waters of Europe.

7. Lionotus [illegible] n.

[illegible] 1915:p.[illegible], Pl.XIII, fig.34-35. Kent 1934:p.745.

Pl.II fig.[illegible].

[illegible] long about 1,5 m.m. long.

[illegible] flattened at the sides and bent in the shape of the letter "J". Anterior end [illegible] in the form of a tail and bent to the dorsal side. [illegible] slit at anterior end of ventral rib; along the left margin of the [illegible] crest of cilia. In the whole body are scattered without any order [illegible] trichocysts. Cilia arranged in longitudinal rows on right side of body. Anus at posterior end. Along the ventral rib are arranged in a row six contractile vacuoles. The nucleus consists of two [illegible] lying in a very long torsellike strand.

[illegible] Prairie waters of Europe.

8. Lionotus [illegible] Lutz.

Lutz 1925:p.54-55, Pl.VIII, fig.1-2.- [illegible]:p.[illegible], Pl.[illegible], fig.[illegible].

Pl.III, fig.34.

Very large cells from 0,55-0,7 m.m. long.

Body lanceolate, slightly flattened and usually rounded at posterior end; anterior end narrowed gradually and bent to dorsal side, somewhat like a sword. Mouth opening is placed in the notch of the ventral rib, occupying the anterior part of the ventral rib. Along the left margin of this notch is fastened a row of cilia, forming the so-called crest; along the right margin of the notch is found a row of trichocysts. The cilia are arranged in longitudinal rows close to one another on the right side of the body. Anus at posterior end. Not far from it is a large contractile vacuole; besides this vacuole along the ventral ~~rib~~ nib are found 4-5 contractile vacuoles, arranged in a row and opening outwardly to the ventral rib. The nucleus consists of two ovoidical lumps, united by a short connection.

[illegible]. Salt lakes of Europe and [illegible] Asia.

5. [illegible]

Fl.III.fig.55-58.

[illegible] ly projecting, more flattened from the sides, so that it has the appearance of a less or fine triangular body. The anterior end is more or less truncate and oblique to one side (dorsal), the posterior part a little elevated and rounded, and also oblique to one (dorsal) side (L.ornatum). [illegible] rather little and occupied by anterior part of the convex margin of the body. Regarding this side of the body, on which is placed the mouth opening - as ventral, and orienting by it all the body, we see, that it is [illegible], as in Limnetis the ventral and dorsal sides are shown in the form of a narrow crest or rib, separating the plastic left and right surfaces of the body. One surface, namely the lower, i.e. that on which Lepidurus moves, or with reference to the location of the mouth - the right, is entirely flat and thinly covered with small and fine cilia. Those cilia are situated in single tufts not closely together, quite evenly and finely from anterior to posterior pole. The upper or with reference to the mouth the left side of the body is bare and somewhat convex, forming a more or less protruding mound or hillock in the posterior half of the body. This mound or inflation accounts to a majority of species the width of the body; it is surrounded on all sides, like the line of a net, with a more or less broad plastic, elastic margin or border. In L. ornatus the inflation lies in the middle of the body, and joins the convex, i.e. the dorsal margin and a broad horse-shoe-shaped plastic border surrounds the anterior and the posterior [illegible] the convex ventral margin. The [illegible] of this inflation differs in one and two sided species and often depends on the amount of food taken in.

The entoplasm appears in the form of a thin, non-[illegible] net, it could be structureless layer. The entoplasm is found only in the inflation, i.e. the width of the body, and does not extend to its margins. It is fine-

[illegible] with [illegible] trichocysts, [illegible] the so-called cortical layer. The cortical layer consists [illegible] from three (L.armatus) sides [illegible] the [illegible] and on the left side of the body. The [illegible] is in the highest degree contractile and elastic and when [illegible] different sides.

In the ectoplasm or to speak more correctly, in the cortical plasma lie the trichocysts which in different species of Loxophyllum have a different distribution. In L.meleagris they are arranged in a row along the ventral margin, [illegible] the ventral margin, [illegible] the body and in some specimens [illegible] to the dorsal margin. The dorsal margin of the body (or the dorsal rib) in this species has a hairy outline, caused by the presence of [illegible] in which in some specimens are whole tufts of trichocysts. In L. armatus the trichocysts are arranged in a row only on the expanse of marginal plasma, occupying [illegible] the anterior, ventral and posterior margin of the body. In L.setiger they are arranged in a row along all the external outline of the plastic body, and in L. rostratum they are concentrated only along the anterior end of the ventral margin of the body.

The mouth opening is slitline and is visible only at the time of taking food. It lies at the anterior end of the ventral margin (or rib) of the body, occupying only 1/4-1/5 of its length. The mouth slit opens straight into the entoplasm, i.e. there is no special oesophagus.

The anus lies at the posterior end of the body and opens outwardly either at the very pole or on the dorsal margin of the body, not far from the posterior pole. Number and location of the contractile vacuoles differ in different species. In L.meleagris there is one contractile vacuole, lying at the posterior end of the body and opening outwardly on the dorsal

[illegible] trichocysts [illegible] the anterior end of the body a constriction often forms [illegible] considerable enlargement and discharges its contents into the [illegible] vacuole. In L. rostratum is found one of the contractile vacuoles at the posterior end of the body, while in L. uncinatum and similar forms are several vacuoles (in the former as many as 15), arranged in a row along the dorsal margin of the body.

The nuclear apparatus is also of various forms and lies always in the ventral part of the body. In L. rostratum the micronucleus consists of two to L. setigera of four ellipsoidal bodies united by a longer or shorter filamentous connection. In L. armatum and setigera it is elliptical or ellipsoidal, while in the former species it is at times rosary like or consists of several (four) spherical or oval bodies of different sizes, united by long or short, filamentous connections. The [illegible] are small, elliptical bodies 5 or more of these lie close to the macronucleus.

The [illegible] occurs in fresh and salt water, although some species (L. setigera and armatum), it seems, are exclusively fresh water forms, and others (L. setigera and rostratum) are sea forms. Their body is [illegible], in the typical species supple and plastic, especially those parts which consist of transparent cortical plasma. The movements of Loxophyllum are not especially quick and may be described as gliding. Swimming always on one (ventral or right) side of the body, they with various skill twist in and out the algae and other submarine objects, seizing them at times with their supple terminal plastic body. There is no rotation about the longitudinal axis of the body, but Loxophyllum often turns from side to side, or still more often bends or circles to different sides with its marginal lashes, as Euplotes, Oxytricha, Stylonychia and allies.

Loxophyllum is a predator, [illegible] feeding on other small infusorians. The [illegible] takes place in the same manner as I described for Lionotus. The prey is killed with a thrust or trichocysts or tentacles are

live , [illegible] visible.

[illegible] was observed in only a few species (L. [illegible] and allied) and then [illegible] by end of cross division. [illegible] individuals attach to each other by their [illegible] ends, their ventral margins.

Three species are distinguished:

1. [illegible] oval, [illegible] and pointed at the anterior end.

2. Have the dorsal margin covered with tufts of cilia; along the ventral margin rows of trichocysts: [illegible] ribbon-or rosary shaped: one contractile vacuole at posterior end. L. [illegible].

2. No tufts along the dorsal margin.

3. Outer margin of body bent with trichites: nucleus of 4 lobes; several (to 12) contractile vacuoles along ventral margin. L. [illegible].

3. Nucleus of 2 lobes: 1-2 contractile vacuoles at posterior end or body. L. rostratum.

1. [illegible] with convex ventral and [illegible] dorsal margin: nucleus ribbon-like: several contractile vacuoles along dorsal margin. L. [illegible].

1. [illegible] Sav.

[illegible] 87:p.[illegible] Pl.IV fig.5. [illegible] 134:p.151-[illegible].

[illegible]ede [illegible] 51:p.35[illegible], Pl.VI fig.3.

[illegible]:p.39.-246:p.10,34,37,80,81 and82. Diesing 56:p.[illegible].

[illegible]steit 1[illegible].p.45. Wrzesniowski 282:p.44-45,Pl.IV fig.28-30.

[illegible] 3:p.[illegible],Pl.[illegible] fig.10.

[illegible] 22:p.71.-[illegible]: [illegible],Pl.[illegible] fig.[illegible]. [illegible] 1[illegible];p.[illegible],Pl.XVII fig. 52

[illegible] 13:p.[illegible]-X.I.

[illegible]:[illegible] [illegible].S.f.[illegible] 175:p.[illegible], [illegible] fig.1-5,

[illegible] fig.1-5.

[illegible] .4.

" "Diesing 55:p.161 and 545.

" " [illegible]

[illegible] Pl.XVIII fig.1.

[illegible] p.268,Pl.IX fig.13.

[illegible]. [illegible] Pl.[illegible] fig.[illegible].

[illegible] Pl.III fig.[illegible].

[illegible] 5,7-5,27 mm. long.

[illegible], flattened at the sides; anterior end narrowed, [illegible] end; dorsal and ventral margins [illegible]. Mouth [illegible] at anterior end on ventral margin. Ring of tentacles; [illegible] ventral side is a row of triangular [illegible] the latter [illegible] a canal extending along the dorsal margin to the anterior end of the body. [illegible] (to 14) [illegible] tentacular connection.

[illegible] Pl. [illegible] Gulf of Europe and Lucia.

2. [illegible] Diesing, [illegible].

[illegible] 5a:p.382-383,Pl.IV fig.17. Diesing 50:p.661. [illegible] Pl.XVII fig.55. [illegible] Pl.[illegible] fig.2

Pl.III fig.56.

[illegible] 5,17 mm. long.

[illegible] each tentacle,thirl-shaped,flattened,convex on one (ventral) and [illegible] on the other (dorsal) side;posterior end often bent to the right side. Right side [illegible] covered with cilia,arranged in rows. Body on three sides (anterior, ventral and posterior) bordered by a plastic margin,con-

...ti... ...anterior ...ers. ... ...ral ... ...ia ...
...e ...ntes (ventral). ... ...ain ... ...anterior ...
... ...

4. Loxodes striatus.

Oval Body in body substance:If the body is oval or long (which is very common and with many individuals) the cavity on the left side of the body may vanish entirely,so that this side appears flat or even a little convex. Either it forms the side on the left side,but widely separated from one another,are on the right side,and in addition the cilia arranged in this are fainter,considerably shorter and are rather like bristles.

The cytoplasm consists of a very thin, homogeneous net,which has a slightly greenish tinge. The cytoplasm into this has an entirely different structure. In consequence of the very large number of larger and smaller vacuoles,filled with fluid,the cytoplasm forms a netlike or spongy skeleton, whose net is entirely within it and depends on the number,size and form of the vacuoles. The protoplasmic skeleton of the entoplasm has in its turn a fine cellular structure and contains in the small grains of food, which are also found in the large vacuoles.The entoplasm appears either colourless, or,depending on the presence of pigment in it,is coloured greenish yellow or even brown. The colouring,it would seem,depends on the age of the individual,since small forms are colourless,while large ones are coloured,so that the intensity of the color grows with the size of the individual.

The ciliate wreath or corona is found at the anterior end of the body, i.e. on the concave side of the ventral margin. It lies in a notch of a fairly long furrow,the so-called peristome,and leads into a short but straight oesophagus. Along all the right margin of the peristome is placed a fine and fast, undulating plastic lobe, extending posteriorly to the peristome within the body. This plastic lobe is coloured yellow,or even dark brown and it would seem serves to give a limit to the peristome. Along the right margin of the peristome is placed a row of fairly long cilia,which are similar in structure to those found on the ventral surface (undulating membrane).

[illegible] ly near the posterior pole on the ventral margin. Not far from it is found one contractile vacuole. Along the dorsal margin of the body is found one row of peculiar vacuoles, discovered by O.F.Müller. The size and number of these vacuoles is extremely variable; they consist of a round, bright and refractive [illegible] whose chemical composition has not been determined with certainty. By their external appearance and optical properties they recall the so-called excretory granules or other inclusions, as I have shown, consist of peculiar [illegible]. Ie. Florkin, the peculiar vacuoles of Loxodes are excretory vacuoles, entirely analogous [illegible].

The macronucleus lies in the middle of the body and has an ovoid or ellipsoidal form; it lies usually a very small, [illegible] are also ellipsoidal [illegible]. In other specimens in place of one there are several micronuclei of different form and sizes, which are scattered without any order through all the protoplasm and are not joined together. In the latter case there are also very extremely small micronuclei, usually lying close to the different micronuclei.

Loxodes occurs especially at the bottom in fresh water and is rarely found on the surface. Its movements are rather quick, but not accompanied by rotation about the axis. It swims equally well on right or left side, constantly rolling from one side to the other; when seeking food it swims very slowly and very adroitly bends its body, turning at times into a loose spiral. The body is supple and elastic; in young specimens it is colorless, while in old it is colored by pigment a greenish-yellow or yellowish-brown color.

Loxodes is a voracious predatory form and feeds almost exclusively on small infusoriums. The amount of food taken by them is so considerable that it influences the internal [illegible] of the individual - [illegible] to the left side of the body becomes more convex.

...lti fication takes place in the ire e ...ining ...ition ... con-
...ists ... ...ition. It ... ...tin... ...tion,that ...ision
...es place ... ... (...ult) ...ci..., it is ...ved in ...ti-
...ion ... ...l...ess ...ntia... ... ...ild t ...ion. ... ...ert-
...g i ... ...l,...l is ...ples ...ving ...ntal ...cle- ... ...
...ntoii,i ... ...ision ... ...toii ... not unit ... one,... is
...erved in other infusorians,and does not divide into two halves - but
... ...

[illegible] large and very large forms
[illegible] 0,15-0,20 mm. long and 0,05-0,12 mm. broad.

Hab. From coasts of [illegible], Liberia, St. Iceland and Ascension Islands.

III. Family Trochelius (Ehrb.) Stein.

The family Trochelius, consisting of only two genera, is characterized by the presence at the anterior end of a longer or shorter proboscis, or [illegible], at whose base is found the mouth opening.

[illegible] oblong-cylindrical or spherical, rounded or narrowed at the posterior end. The [illegible] of this family or slender proboscis or neck at the anterior, which is usually bent to the ventral side. Cilia cover all the body, and are arranged in longitudinal meridians or spiral rows. Besides the cilia there is one row or longer cilia but more closely together, extending from the apical end of the proboscis along its ventral margin, passing about the mouth opening and again directing its way to the anterior end of the proboscis, forming the so-called oral ciliary band.

The [illegible] consists of an ectoplast layer and a thin pellicle. The entoplasm is fine cellular and has the peculiar structure of Trachelius.

The mouth opening is placed on the ventral side at the middle of the cupola-like [illegible] situated at the base of the proboscis. It is prolonged in a tubular, sometimes narrowed pharynx, whose walls are surrounded by fine [illegible] which highly retractile at its end, forming in its general intricacy the so-called rod apparatus.

The anus is placed at the posterior part of the ventral side. There are several contractile vacuoles; they are either scattered without any order through the body (Trachelius) or arranged in a row (Dileptus) along the ventral side of the body.

There is one macronucleus - ellipsoidal or rosary-like [illegible], or it consists of two ovoid balls (Trachelius), and sometimes of many balls, united by a moniliform connection (Dileptus). Either one or several micronuclei; they lie close beside

the Karyorhexis.

The free or slightly adherent Holotrichs almost exclusively [illegible] and Litosts - the [illegible] are. [illegible] the free living condition.

The family Trachelinidae established by Claparède, like most investigators, referred to this family [illegible] to the family Holophryidae. I refer to the family Trachelinidae two genera: Trachelius and Dileptus, which in their general organisation (ciliary covering, presence of [illegible] and oral ciliary band, mouth opening and oesophageal apparatus) are rather widely separated from representatives of Amphileptidae or have more affinities with Lacrymaria.

Key to genera and [illegible] species.

Key for determining genera of Trachelinae.

1. [illegible]; proboscis short; contractile vacuole scattered through out the body; [illegible] one or two nuclei; no trichocysts..Trachelius.

1. Not elongated, pointed at posterior; proboscis long; contractile vacuole arranged in a row along the dorsal side; nucleus consist of several [illegible], trichocysts along ventral margin of proboscis.. 2.Dileptus.

1. Trachelius Schrank.

1.III fig.30.

[illegible] form, ellipsoidal or spherical, rounded [illegible] at the posterior end. In the middle it is drawn out into a longer or shorter pointed proboscis, bent to the dorsal side. Ventral side a little flattened and provided with a furrow beginning at the post oral end and gradually narrowing [illegible] nearly to the middle of the body, where it opens out into a shallow pit. This furrow can [illegible] it has been only when Trachelius swims rapidly freely, with [illegible] when relatively immobile e.g. [illegible] or the cover glass, they become invisible. On the ventral side at the base of the proboscis it is placed the oral opening.

The [illegible] rather short and fine cilia, arranged in longitudinal [illegible]. These cilia [illegible] and [illegible] at the posterior end of the [illegible], and certain peristomial [illegible] in the anterior end. The peristomial stripes of the central side reach to the [illegible] lateral stripes they bend [illegible] and unite at an acute angle on the central area of the prosoecia. Along this central [illegible] there stretches from the anterior end of the [illegible] a narrow and right [illegible] which [illegible] to the posterior end of the prosoecia. Along all its length [illegible] a row of [illegible] long cilia, forming indeed the oral [illegible].

The ectoderm consists of a rather [illegible] thin epithelial layer, limited externally by a very [illegible] thin cuticula. In some specimens there [illegible] to the base of the prosoecia is covered with a [illegible] thin layer of amorphous gelatinous matter, which at times attains [illegible] enormous. Upon this rests the cilia, covering the body. The [illegible] of the ectoderm in the [illegible] an entirely peculiar structure. In addition to these, at times very large vacuoles, filled with [illegible], the ectoderm cells contain a reticular or spongy skeleton, the chief mass of which is found in the center of the body [illegible] the nucleus. The [illegible] of the protrusile evagination of the entoderm is extremely variable and depends on the quantity, size and form of the vacuoles; this evagination has [illegible] structure [illegible] masses of their [illegible] or [illegible] or [illegible].

The anal opening is [illegible] on the somewhat flattened ventral side of the body, at the base of the prosoecia which is bent to the dorsal side. It is in the middle of a purse shaped protuberance, covered by a right [illegible] with large cilia. The surface of the purse shaped protuberance is provided with radial [illegible] cilia, like a sphincter and narrows and [illegible], enclosing or freeing the mouth opening which has an irregular outline. The anal opening is [illegible] in a rather long, laterally narrowed

light. [illegible] the contractile vacuoles [illegible] with the power of emerging and retiring [illegible] literature.

[illegible] the position and of the [illegible] the ventral [illegible] class of a ventral action; it is [illegible] seen only at the time of [illegible]. The contractile vacuoles are many (up to 20); they are scattered [illegible] rather thinly [illegible] and do not [illegible] at the same time.

[illegible] lies to the middle of the body and has an oval or ellipsoidal form; [illegible] it then usually lies a very small, more or less oval or ellipsoidal macronucleus. In some specimens the macronucleus consists of two ellipsoidal lobes, united by a very short and fine connection.

Frontonia occurs not only in fresh water and is a rather common form, although it seldom occurs in large numbers. Its movements are rather quick and complex, usually by rotation about the longitudinal axis of the body. The body is very mobile and elastic; the protoplasm possesses a peculiar motion, which, being somewhat like the motion of the water flea, when moving through the water in direction straight ahead and as if were halves for leaping. When swimming they it seems likely that the mouth opening protrudes ahead. The food consists of infusorians and diatoms.

Multiplication takes place in the free swimming condition and consists of cross division. The small individuals arising from division have a very small [illegible], like a wound, which [illegible] in time. Conjugation has been observed very rarely. When encysting Frontonia withdraws its protoplasm from the body, takes a roundish form and [illegible] in size. Vacuoles, found in the ectoplasm, disappear at this time and [illegible] entirely, so that the ectoplasm loses its reticular appearance and becomes homogenous. Soon there appear cysts at first [illegible] with a thin and then gradually with a thickening envelope. As the cysts form, the numerous contractile vac-

[illegible]

[illegible]

1. [illegible]

[illegible]

[illegible]

[

the body is somewhat constricted at the sides and less so anteriorly to the dorsal side. The mouth is placed on the ventral side at the base of the proboscis.

The mouth [illegible] is covered with fine and relatively short cilia, besides on a ridge on [illegible] inner ciliary [illegible]. The latter begin at the posterior pole and [illegible] that they run to the anterior end. On the ventral side the cilia[illegible] extend to the mouth opening, then they bend to laterals and at an acute angle extend along the ventral margin of the proboscis; more anteriorly they rest in the narrow, cross striped, somewhat convex [illegible] which [illegible] from both sides along the ventral margin of the proboscis and reach almost the mouth opening. Along this stripe there are scattered longer and more thickly set cilia, which reach almost the mouth opening, leaving the mouth [illegible] between these two stripes, i.e. immediately on the ventral margin or rim of the proboscis are placed large and thick trichocysts; they are arranged very thickly, without any order, perpendicular to the surface of the proboscis.

[illegible] the body is covered by a thin, homogenous pellicle. Under it lies a coarse granular and contains a layer of small granules highly refractive of light. In the skin lies through all the extent of the body (with the exception of the proboscis) the large separate rods, having the appearance of trichocysts, but considerably larger, than those which are seen in the proboscis.

The mouth opening is placed on the ventral side, at the base of the proboscis and has a very intricate structure. Around the mouth opening is found in the middle of a narrow line protuberance, corresponding probably to the mouth area of [illegible] and furnished (on the surface) with radial stripings. The [illegible] protuberance is bordered by a narrow infolded ring, [illegible] radial stripings, but they are farther apart than the radia

striping of the cuticle-like articulation. The right lateral lip, at the anterior side, carries a tuft of cross-striated fibrils. In the same manner, these fibrils extend along both sides of the ventral lip of the proboscis, quite to its anterior end where they touch with oral cilia.

The mouth is an oval opening, bordered by a double, thick-walled membrane, which can attain a very considerable thickness. The mouth opening and the entire esophagus can easily be isolated by the aid of pepsin, so that the margin of the mouth opening appears as a ring-like structure surrounding the cuticle-like protoplasm. Immediately under this cuticle, i.e. in its radial stripes and around the external wall of the esophagus lie numerous, long, thin fibrils, forming in their general complex a complete net apparatus, the radial strands of which are the fibrils mentioned.

The mouth lies on the ventral side at the anterior end of the body, at the very place where the body narrows into a tail-like process.

The contractile vacuole is numerous (sometimes as many as 20) and are situated in a single line along the dorsal side of the body. They lie at the posterior end and reach to the proboscis, lying there in a straight line.

In a majority of cases the whole body or ciliate is filled with numerous (about 200) rounded, refractive, pearl like cells. In the living condition they are rather highly refractive of light and homogenous; like they were a fine-cellular structure not are colored, though not very bright. In very young granules (although not among all) it is possible to see with high application extremely fine cuticular stracts. All these observations indicate therefore, that the granules are cells or, possibly more correctly, one cell, one nucleus. Later investigations indicate also this fact, that in fine sections, showing one long, cord-like chromosome, which lies in several coils, especially around nucleoli.

[illegible] is not [illegible], although always more [illegible] [illegible]. It lives at the bottom of fresh waters, swimming [illegible] the other main stages. In movement it [illegible] [illegible] vallei; when it swims it constantly takes a forward direction and slowly and constantly rotates about its longitudinal axis. The proboscis it would seem serves for locomotion, in some way assisting it turn it in different directions without [illegible], [illegible] the different objects [illegible] to it with. In [illegible] water Dileptus moves with extraordinary quickness, one [illegible] [illegible] second, and rotates [illegible] about its axis.

The [illegible] and especially the proboscis are very sensitive; a majority of [illegible] the body is colored brownish-yellow.

Dileptus is a very voracious carnivore. It feeds on [illegible] infusorians, entering them at times with its proboscis and at times with [illegible] mouth opening. Upon seizing food mouth and oesophagus open widely and swallow food of very considerable dimensions. The prey swallowed, [illegible] the oesophagus, is surrounded by [illegible] liquid in which as it were it is [illegible]. Such a food vacuole moves about in the entoplasm of Dileptus and its contents are constantly digested, while it very much encreases in size; [illegible] the food included in it virtually little feces into a [illegible], which is excreted [illegible] the anus.

[illegible] species:

1. Dileptus anser O.F. Müller sp.

[illegible] 67; [illegible], Pl. II fig. 17. Perty 1852, p. 152, Pl. I fig. [illegible].

[illegible]: [illegible], 31 and [illegible]; [illegible], 31 and 32.

[illegible] 1[illegible]; p. 44-45, Pl. I fig. 7 [illegible]. — 1861; [illegible] fig. 8-12.

[illegible] fig. 2. [illegible] 1[illegible]; p. 1[illegible]. [illegible] 1[illegible]; p. 1[illegible].

[illegible] 1[illegible]; [illegible], Pl. [illegible] fig. 4a-[illegible]. [illegible] 1[illegible]; [illegible].

[illegible] 1[illegible]; [illegible]. Pl. [illegible] fig. [illegible].

[illegible]: Dileptus [illegible]. [illegible]; p. 15[illegible].

" " [illegible]; [illegible]

[illegible]

[illegible]

[illegible]tus anser.[illegible]renter, 00:p.355,Pl.XXVII fig.4.-00:p.[illegible].

" " [illegible]; 3:[illegible]-7:[illegible].

" " [illegible]

" " Fromental 103:p.288,Pl.XVIII.fig.3.

" " [illegible]

" [illegible] Dienkowsky 00:p.302,Pl.XI fig.17-18.

" " [illegible]

" [illegible]

" " [illegible]

" " [illegible]

" " Fromental 103:[illegible],Pl.XIX fig.7.

" [illegible]

" " [illegible]

" [illegible] Sent 104:p.524,Pl.XXVII fig.33.

" " Daday 02:p.431.

" " Stokes [illegible]

" [illegible].Stokes [illegible] Pl.I fig.3.-[illegible]

Pl.IV fig.32.

" irregularis.Masaeil 102:p.3 Pl.I fig.12.

[illegible]nasutum. Merlica 122:p.75.

[illegible] Pl.II fig.31.Pl.II fig.131.

[illegible] Long. [illegible] mm. long, [illegible] mm. broad.

[illegible]. From seven [illegible] of Europe, America, New Zealand and Europea[illegible].

viii. Family. [illegible]

[illegible] to which belongs [illegible] the genus [illegible] chara-

[illegible] [illegible] [illegible] the position and association of

the [illegible] and [illegible] apparatus.

brown

left. It stratifies also all the epithelia which are of ectodermal origin (i.e. epidermis, lens, cornea). The structure of the skin, the density and distribution of the cells in different species is not the same. The ciliary girdle sits in a small furrow, forming with its cuticular differentiation on the inner side of the body wall (forming part of) the nature of a constriction of the cuticular wall.

The cuticle is more complex in structure, composition and relationship, especially in the region of the ciliary girdle: in some species it consists of 2 cuticles, in others of 3 cuticles; in some species it consists of 2 layers, in others of 3 layers. In the cuticle of the ciliary girdle are to be found the nerve endings for sensory cells, or cell-processes. In some species the cuticle-cell boundaries are very distinct, in others they are not. The nature of the cuticle-cell boundaries is also different in different species. In the cuticular layer or cuticle is to be found (in some species) a network of fibrils, which are not always distinguishable (in at least some), from the substance of the cuticle in which they are found. The cuticle is not chitin, and it differs from the cuticles of insects in that it does not contain lipid and it is not digested away by chitinase. The cuticle is also not digested away by enzymes which are capable of digesting the cuticle of insects.

In the cuticular plasma, and in other species in the sub-cuticular plasma, fibrils are found in the cuticular surface and are arranged through all the body. They are not found in all species (e.g. Oligochaeta, Turbellaria and Nematoda) and are not always in all specimens. The length of the fibrils differs in different species: in A. faecalis they are very long, while in A. megalocephala they are short. The fibrils are often very thick in the cuticular plasma, and are arranged in a definite pattern in the cuticular plasma, forming a network. The fibrils are often seen to pass into the epidermis, forming a fibrillar structure. In the cuticular plasma there are also found, especially in the ciliary girdle region, so-called basal plates. In the cuticular plasma but

ly no setae at all. It is usual merely on the left side of the ventral on the body and it , like the body itself, is rather coarse.

In some species (for example S. melanos) the body is covered with a very thin (c. 01 m.m.) and transparent chitinous layer, which at times attains a rather considerable thickness. This gelatinous layer easily swells in weak acids, especially after action of weak acids or by solution of sodium, and it then is ten times the original thickness.

The mouth, lies in the deep oral hollow, place on the ventral side of the anterior (third or fourth) part of the body. This cephalic region, or so-called vestibule, is of different shape and not especially long, only it constitutes and therefore it rather considerable length being a point-cone. The internal walls of the vestibule form the cuticular lining, being the invagination of skin, on the outside of the vestibule at the time of moving round, and the mouth appears protrusive outwardly. In S. stercorarium and Cercaria the vestibule rises at times a ring of folds. The mouth opening either leads immediately into the oesophagus, or in some species (for example S. melanos and aurea) passes first into a rather broad lacunic cavity, leading towards the distal i.e. the head end of the osesophageal apparatus. On the invagination of the oesophageal apparatus - by a fine lining in connection with it and has the appearance of a ring of cuticular, laminae with a fine striation, having a spiral arrangement. This cuticle covers during the mouth opening and it, and principally, like a sphincter, causes the closing and reopening of the mouth opening. Into the oesophageal apparatus is pulled within the body the mouth opening is very small, and the collar has a complex form: the cuticle lined the oesophageal apparatus is thrust into or moves out, even to the level of the vestibule, into the mouth opening as well as the collar, vestibule cuticle, and the latter takes a cylindrical form with terminal enlargements.

closes up a thin plasmatic wall.

...ellii, and ...ritical, but it is not easy to ...
...ormal. Inside the ...ellule is usually one central, ...
...ecal ...vesicle, but this is free in the cytoplasm. In A. longa there are usually several nucleii (about 3). The position of the chromatophores is likely of a specific or generic importance, while the distribution of the entoplasm, observed in Nassula; in a majority of cases the chromatophore is found in the anterior part of the body.

Nassula counts at least ten species, this ... possibly in five (N. aurea, N. elegans, N. frigida, N. longa and N. viridis), others ... probably in that order (N. ambigua, N. citrea, N. ornata, N. taeniata). Under this ... they are ... often met with single ... or large numbers. Usually they are found on the bottom of the pools, ... with ... They ... and ... ; ... accumulate usually ... on the ... ; ... in ... ; ... but ... ; ... in the ... ; ... in a majority of cases very large, so that Nassula stands out ... with ... ; ... ; ... ;

transmitted

blue-green

phycocyanin

phycoerythrin

phycocyanin

phycoerythrin

[illegible] ironish yellow), urine is cast out through the anus. The chemical reaction [illegible] vacuoles and granules [illegible] also a proof of this explanation. If [illegible] the cover glass, the blue drops are dissolved entirely in the salt-water - [illegible] of magnesium-sulfate. If ammonia is brought to [illegible] water, the blue color of the drops vanishes in the body of the animal, but are very [illegible] in water; the granules [illegible] at the death of the infusorian. The precipitates consist of [illegible] chemical changes, since the reagents [illegible] in water; [illegible] is formed. The [illegible] small grains of granules slightly refractive of light found in some drops, remain without change; they preserve even their blue color, though it only exists [illegible] dots. I have not succeeded in [illegible] how these fat granules are formed in the blue drops. Why the blue drops gather in one spot in the anterior part of the body also remains without explanation. If fecula is pressed gently (under the cover glass), the blue drops pass from this spot and are scattered through the body. Even the pressure-cysts [illegible] together in the same place.

Multiplication takes place in the free swimming condition and consists in cross division. In the encysted condition, this mode is exciting, assuming [illegible] multiply. Only resting cysts are found, having spherical or ellipsoidal form. The envelope of the cyst is smooth or furnished with fine rods arranged longitudinally. Besides this envelope there is at times a second, outer, thinner, skin-like envelope. When conjugating, which occurs very rarely, individuals attach by mouth openings [illegible] are joined [illegible]

acinata

"acination"

* 4. Body ovoid or cylindrical: adoral row of cilia.

6.

N. neapolitana.

5.

A. rubens.

4.

A. labrella.

3. ~~spherical~~

A. sphaeroteca.

2.

A. thereses.

1. Nassula aurea Ehrenbg.

[illegible]

" " [illegible]

" " [illegible]

" " [illegible]

" " [illegible]

" " [illegible]

" " [illegible]

" [illegible]

" [illegible]

" [illegible]

" [illegible]

" [illegible]

" [illegible]

" [illegible]

[illegible]

" [illegible]

[illegible]

[illegible]

" [illegible]

[illegible]

[illegible]

" [illegible]

[

[illegible]

III. [illegible]

[illegible]

[illegible]: [illegible],173,3 5,3 1,Pl.I,fig.1.-35:p.154.-38:p.[illegible],[illegible]

[illegible].

[illegible]: [illegible]; p.[illegible],Pl.VII 2,fig.1-3.

[illegible]: p.551. [illegible]; p.[illegible],[illegible] fig.-28:p.[illegible],Pl.

[illegible]: [illegible]. [illegible]; p.[illegible]. Sutton 11:p.155.

[illegible]: p.[illegible]-[illegible],Pl.III,fig.34-38.

[illegible]: Wallava. Claparede and Lachmann 58:p.527-[illegible]28,Pl.XVII, fig.6.

" [illegible]:p.527.

" [illegible].

" [illegible].

" " Maupas and Roeser 112:p.482-483,Pl.XVIII,fig.8.

[illegible]. Dissing [illegible]:p.177 and 242.

[illegible],Pl.I,fig.[illegible], Pl. II,fig.1 2.

[illegible] median size from 0,1-0,14 mm. long and 0,05-0,[illegible] mm. broad.

[illegible] flattened in a dorso-ventral direction,somewhat [illegible] in the middle and nearly rounded at both ends. Nucleus [illegible] a very little to left side.Cilia on longitudinal striae. Mouth on [illegible] right side of body. Anterior [illegible], cilia; posterior [illegible]; in the latter lie the trichocysts. Pigment spot [illegible] left side in anterior part of body. Mouth opening in [illegible]-like [illegible]. Contractile apparatus long,tunnel-shaped with dilatations [illegible] at anterior end, consisting of [illegible] spirally circling [illegible] coils. Less [illegible] ventral slit at posterior end of body. One contractile vacuole [illegible] right side in middle part of body. In one specimen 2,3 and even 4 contractile vacuoles. Macronucleus ellipsoidal with myeronucleus lying near it. Greenish-white color. Pigment spot yellow.

dal. Fine cilia of buccal and peristomial lobes.

3. [illegible] Lutz.

Lutz [illegible]:p.551-[illegible],Pl.[illegible],fig.1-3.

[illegible] figures.

Large forms - [illegible] position from 0,3-0,4 mm. long and in anterior stage from 0,1-0,2 mm. long.

Body oval-elongated,equally rounded at the anterior and gradually narrower at the posterior,rounded end.Anterior end slightly bent to the left side; body slightly flattened on the ventral side. Cilia on longitudinal stripes. Dorsal row of cilia stands [illegible] anterior and ventral to dorsal side. No trichocysts. Mouth opening in shallow, slit-like notch. Oesophageal apparatus rather long,funnel-shaped with oval-like inflation at anterior end,it consists of [illegible] circular rods. Anus at [illegible] end of body. Four contractile vacuoles arranged at intervals on [illegible] and two close together to the mouth opening. Endoplasma [illegible] numerous [illegible] and [illegible]; body contractile; [illegible] in coiled.

Syn. European [illegible].

4. Uronema nolandi Penty sp.

Uronema nolandi Penty [illegible]:p.511,Pl.[illegible]III,fig.2. Diesing 50:p.559.

Uronema [illegible]:p.[illegible]1,Pl.[illegible]VI,fig.4. Lutz 154:p.[illegible].

Syn.: Cyclidium uronema Penty 131:p.143,Pl.IV,fig.10 a-c.

" " Stein 211:p.51-[illegible].

Leucophrys vulnus.Stein 211:p.50.

Small forms 0,07 mm. long.

Body ellipsoidal,equally rounded at both ends,with anal opening on left side;ventral side a little flattened. Cilia on longitudinal stripes. Dorsal row of cilia extends to dorsal side. Trichocysts of very large size in [illegible] forms on the body. Mouth opening at the bottom of a [illegible]-

dorso-ventral direction and provided with a slight scallop on the left side of the anterior third of the body. Cilia in longitudinal stripes. The mouth opening is situated at the anterior end on the ventral side. The oesophageal apparatus, funnel-shaped with club-like inflation at anterior end, consists of several rods. Contractile vacuole on the right side in the middle of the body. The macronucleus is very large, ellipsoidal, with a scallop, in which is situated the micronucleus. It is of a rose, yellow or greenish color.

Occurs in European seas.

2. Uronema marinum Dujardin.

Dujardin 41:p.241-243, Pl.VI, fig.42-44. Claparede and Lachmann 58:p.328.

[illegible] anterior fourth, the body has a slight [illegible]

[illegible]

[illegible]

[

(Distribution, [illegible]).

[illegible] genera.

...tethe group - hypostomata or ventral-mouthed.

...I ...

...I ...

...ventral ...

...ventral ...

rator stoma, narrowed or equally rounded. The ventral valve is sometimes visible for [illegible] at the side of the body, a [illegible] or less protrudi[illegible] beak.

The side [illegible] the body are not [illegible] but [illegible] beyond the lateral side [illegible] the dorsal [illegible]

[illegible] the ventral side [illegible] the [illegible] valve [illegible] the [illegible] valve [illegible] the [illegible] valve

...3: ...filoron Aulcus...flomentei 105:p.200-201,Pl.XVI fig.1.

...Pl.III fig.71.

[o] - long,in first ...ent condition from 0,2-0,26 mm.long;in contrac-...condition from 0,03-0,15 mm. long.

...body oblong, ...rowed at the posterior and direct ...ard is a long ...median process at the extrior end and bent to the left ...ventral surface first. This is longitudinal ...ventral side longer than dorsal side. Mouth open-...ventral side near right ...in: ...ervous apparatus ...consists of 1 pair. ...ventricle is ...ed on left side in middle of body. ...contains ...ellipsoidal with ...numerical myonuclei lie in it.

...ii. ...ntrance ...

...e. ...ntrance ...

...ventral ...ventricle 1 pair: 40.

Pl.III fig.71.

...ventricle ...,03 mm.long and 0,018 mm.broad.

...body ...-oval,rounded at the posterior and pointed at the anterior ...side is bent to the left side. ventral surface flat. This is longitudinal ...ventral ...ventral side longer than dorsal side. Mouth open-...ventral side near right ...in: ...ervous apparatus ...consists of 1 pair. ...ventricle is ...ed on left side in middle of body. ...contains ...ellipsoidal with ...numerical myonuclei lie in it.

...ii. ...ntrance ...

...e. ...ntrance ...

Pl.III fig.73-75. Pl.VII fig.133.

...body ...ellipsoidal,oval or ovoid,rounded at both ends (...ulcus,dent-...ata and ...ravi) or ...-ellipsoidal pointed anterior end,which is rit-...ed or ...bent to left side (...ventriculus ,propellens and ...ulatus). The posterior end of the body is ...ed and ...ounded (Ch.ovulatus and ...ravi) or ...ounded ...ly or ...ed ...ventrally (Ch.dulcis,...ventriculus and ...propellens) ...ounded,or ...inted (...ovulatus). The body is ...ewhat ...ly ...ened in ...ventro-ventral direction to ...ll its extent or in

t[illegible] (to proteleum). [illegible] is in the middle of the anterior part, [illegible] a pair of long protruding cirri, arranged, like the [illegible] of a spiral, [illegible] the anterior [illegible] the body; [illegible] the [illegible] the [illegible] the

than

13 contractile vacuoles. Ch. quinquei.

1. Chilodon cucullulus O.F.Mull.sp.

[illegible]

[illegible] 717,Pl.LII,fig.15-22. Haswell 152:p.59. Stokes 246:p.[illegible]
[illegible]ff 198:p.40. Lauterborn 140:p.219.

[illegible]:Ch.uncinatus.Entwistle, 65:p.154.--66:p.537-538,Pl.XXVI,fig.3.
" " " 65:p.175 and 647.--66:p.571.
" " [illegible] 214:p.110.- 214:p.150,152.
" " [illegible] 41:p.203 and 231,Pl.XIII,fig.12-13.
" " [illegible]
" " [illegible]
" " [illegible]
" " [illegible]
" [illegible] 214:p.325-328,Pl.III,fig.13.--245:
[illegible],fig.1.
" [illegible] 214:p.[illegible]
[illegible],fig.4.
" [illegible]:p.38-90,Pl.VII,fig.1-5.
[illegible]
" [illegible]
[illegible],fig.7-11, [illegible]
[illegible],fig.15-19.
" " [illegible]
" [illegible]
[illegible]:p.42,53,60,66,73,Pl.IV,fig.3.-55:
[illegible],150.
" " [illegible]
" " [illegible]
" " [illegible]
" [illegible]
" " [illegible]
" [illegible]
" [illegible] 184;p.152,Pl.[illegible],fig.11.
[illegible] [illegible]
Pl.III fig.73, Pl.VII,fig.188.
[illegible]

[illegible]

[illegible]

[illegible]

4.

[illegible] I 7:p.483-487,Pl.41,fig.22-24.

[illegible]:Ch.megalotrochae.Stokes 252:p.571-572,fig.30. -240:p.[illegible]571,

Pl.2,fig.2-3.

Pl.III fig.74.

Form of shell[illegible] from 2,25-2,11 mm.long, and from 1,50-2,27 mm.

[illegible].

[illegible] ventral median longitudinal line[illegible] is marked at both ends. Ventral median concavity,covered with cilia,[illegible] a longitudinal [illegible] projection in the middle [illegible] with cilia. Dorsal surface convex,[illegible] provided with a longitudinal slit-like. Right side of body convex,[illegible] left side straight. Mouth-opening in form of longitudinal slit in anterior third of ventral surface,near the left margin. Oesophagus at first,consists of [illegible] zone,ciliated,lies in a low angle to the right surface. Near the mouth and parallel to the left margin is a row of cilia,forming [illegible] undulating [illegible]. A section of the ventral side in the middle of the body,posterior to the mouth opening. Section [illegible] in posterior half of body.

[illegible]. Cross section of middle and hind[illegible].

5.

[illegible] II 23:p.1585-1586,Pl.LX,fig.7.

[illegible]:Ch.cirriferus.Zeller II 7:p.35-40.

[illegible]. Trematoda 1[illegible]:p.[illegible],Pl.[illegible],fig.10.

Pl.I fig.75.

[illegible] small form from 0,34-0,39 mm.long.

Body ovoid,narrowed at anterior end,[illegible] is bent to the left side,and [illegible] and equally rounded at the posterior.Ventral surface flat,covered [illegible] cilia arranged in longitudinal rows.Dorsal side convex and [illegible]. [illegible] ventral surface part of body on ventral surface. Mouth leads into [illegible] oesophagus,surrounded by a ring apparatus;the latter is narrowed

[illegible]

[illegible]

[illegible]

1. [illegible]

[illegible] 130:p. 7-38,Pl.II,fig.1. Sent 134:p.[illegible].

[illegible]:Chl.cyclops.Lnts 38:p.343-345,Pl.XXI,fig.14-15.

...

...

...

[illegible]

[illegible] fig. 21.

[illegible] to the dorsal side, plasmatic border, like the [illegible]. On the ventral side is placed a series [illegible] into [illegible] the ventral surface of the body. According to the [illegible] are arranged in [illegible], and collect [illegible], the inner [illegible] to [illegible]. [illegible] the [illegible] (especially those [illegible] the posterior part of the body, for example [illegible]) to [illegible] are arranged parallel to [illegible] and [illegible] to the [illegible].

The [illegible] is placed on the ventral side in the posterior [illegible] of the body, and leads into a short [illegible], surrounded by [illegible].

The [illegible] system is in the [illegible] of the body. The [illegible] consists of ten [illegible], united, [illegible], by [illegible].

Digestion [illegible] and is found on the bottom [illegible]. [illegible] fig. [illegible].

A single [illegible]:

[illegible]

[illegible] fig. [illegible].

[illegible] fig. [illegible].

[illegible] fig. [illegible].

Lancet

[illegible]

[illegible]

[illegible]

d of the body (tail-like process), transformed, to the ventral surface, because of the somewhat rounded posterior end.

The ciliary covering is present only on the ventral surface. The cilia are arranged in longitudinal stripes close to one another, extending mainly over the tail-like process of the posterior end. The stripes divide [illegible] the lateral cilia are closer to the outer envelope of the body [illegible] and anterior to it unite at an oblique angle. [illegible] the cilia, covering the [illegible] and the ventral side [illegible] one [illegible] are [illegible], so that at the anterior end they [illegible] the appearance of a fringe. At the posterior end on the right side of the tail-like process [illegible] relatively long cilium [illegible], corresponding to the [illegible] and existing of some [illegible] cilia [illegible].

The endoplasm consists of a very thin crystalline and transparent layer. The ectoplasm is finely granular and is in a majority of cases colored greenish, yellow, green, red or violet. The color is caused principally by the [illegible] taken in. At the anterior end of the body is found a pigment spot, having the shape of a crescent [illegible]: its outer edges with that of the body only [illegible] to close at the posterior and at the anterior end of the body between the [illegible] and anterior ends it forms a layer of transparent contents [illegible], which [illegible] the digestive organs consists.

At each opening, it [illegible] is the external layer of the body so that the [illegible] and the appearance of an oesophagus set apart. The mouth is [illegible] a short passage, having the appearance of a tube, [illegible] extending slightly to the left and down. The oesophagus is surrounded by short and broad rods, forming by their union the rod or oesophageal apparatus.

[illegible] fig.15.

" " Diesing 50:p.771.

" " [illegible]

the right side and ventrally on the ventral surface.

The macronucleus lies also in the middle of the body, at the left side. It is ellipsoidal and includes a cross slit. Behind it lies a small one [illegible].

Encystment occurs in stem cells and loose cells. It is found usually at the bottom and lives in the stem cells often, rarely loose, its cysts are not usually spherical round or oval and usually accompanied by nutrition cysts at the beginning also often it exists in the ventral surface on front of metabolism the transverse division line a root. Multiplication occurs in the free swimming condition and consists of cross division.

Two species are distinguished:

I. Anterior end pointed and bent to the left side; dorsal side arch. ventral side.

II. elongate.

I. Anterior end obliquely cut to the left and slightly convex; dorsal side concave; at anterior end large cilia.

II. pleuronema.

Uronema elongatum Duj.

Dujardin 07; p. 500-501. Fig. 13. Stein 216; p. 116.

Fromentel 80; p. 555-556. Kent 154; p. 767, Pl. XLII Fig. 47-48.

Uronema: Uronema marinum Duj. Mermann 22; p. 280, Pl. XIV Fig. 14.

" " Fromentel 80; p. 551.

Uronema marina Wrzesniowsky 102; p. 51-52.

" " Kent 154; p. 767.

Very small ciliate about 0,025 mm. long.

Body oval, distinctly dorso-ventrally; anterior end pointed, bent to left side, posterior - rounded and provided with small tail-like cilia. Dorsal surface convex, ventral flat. Body slightly convex; its anterior part covered with cilia

[illegible] [illegible] [illegible] [

[illegible] valves),the ventral (right and left)sides of leaves (bearing, owing to the right and left sides of the ventral surface) and a ventral surface in the appearance of a more or less deep groove,in the direction in which the margins of the leaves are rolled.

The form of the body is generally cylindrical or ovoid (S.monotyla) or ovate (S.limnica) with rounded angles or sides,or ovoid and compressed at the sides (S.diversifolia),or ovate and flattened at the sides and narrowed at the posterior end (S.intorta or recurvata).The so-called ventral sides or leaves are not quite as flat;the right does appear in the form of a thin oval plate only and is more or less distinctly curved or bent;the left real is bilobed,the division at the anterior end with the large (S.monotyla,diversifolia,limnophila) or small (S.ovata) sinus and lobules.The free margin is almost straight or slightly curved,but the posterior margin has a small projection within these protrudes a plastic process,giving it when moving. This process is capable of being used as a cornicle or locomotor organ (S.monotyla,diversifolia and salcata),while in S.cymbifolia it is rudimentary and is also capable of being retracted,and in S.limnica it is quite undeveloped.The ventral or dorsal surface of the body is bare,smooth or is furnished with longitudinal furrows and slightly protruding lines.The number and location of the furrows and ribs varies in different species:thus in S.monotyla on the left leaf near the apical margin are found one to several furrows;in S.limnophila near the base are found one longitudinal furrow,in S.salcata and diversifolia 4 and 6 longitudinal furrows,parallel,on the right leaf and often on the apical surface and rarely in S.ovata 2-3 ribs arranged on the left leaf and extending obliquely to the left side.

Cilia are always on the ventral or the left or do not occur at all, but they on the right side i.e.the internal surface of the right leaf,turn to the ventral side. The cilia are rather closely set longitudinal strips,extending parallel to the external margin of the right leaf.

[illegible] [illegible] [illegible] [

[illegible] two of these certain species there were recognized by [illegible] (Bel;p.200-207,pl.x ii,f.1 and 2b),two other species [illegible] described,which were however considered it is very unsatisfactory may the [illegible]

[illegible]

[illegible]

[illegible]: [illegible] [illegible] 57;p.407,pl.x,figs.17-1[illegible].

[illegible] [illegible] 58;p.[illegible],pl.[illegible],figs.14.

" " [illegible] 59;p.[illegible],pl.[illegible],figs.

" " [illegible] 60;p.[illegible] and 61.

[illegible] [illegible] 61a;p.[illegible]-[illegible];pl.[illegible],figs.[illegible]-[illegible].

[illegible]

" " [illegible] 1865;p.36.

" " [illegible] 66;p.[illegible]-[illegible].

" " [illegible] 1[illegible];p.[illegible]-[illegible];pl.

" " [illegible] 1[illegible],pl.[illegible],figs.5-7.

" [illegible] 67;p.405,pl.x,figs.15.

" [illegible] [illegible].

[illegible] [illegible] 1[illegible];p.[illegible],pl.[illegible],figs.[illegible]-[illegible].

" " [illegible] [illegible]:p.[illegible]-[illegible],pl.[illegible],figs.11-13

" Reynoldsia plaited and Lachmann 68;p.256,pl.xv fig.16.

" [illegible] [illegible]:p.[illegible]-[illegible],pl.[illegible],figs.[illegible]

" " [illegible] 1[illegible];p.[illegible]-[illegible],pl.[illegible] figs.[illegible]-[illegible].

" " [illegible] [illegible] figs.[illegible].

" " [illegible]:p.[illegible]-[illegible]. figs.

[illegible]

figs.2.

[illegible] [illegible] 69;p.[illegible].

" [illegible] 70;p.[illegible].

[illegible] [illegible] 1[illegible];p.[illegible].

[illegible]

[illegible] figs.[illegible].

[illegible] [illegible] [illegible] figs.[illegible].

with curved margins - left less so,with scallop at [illegible] and

[illegible] with [illegible] - left less so,with scallop at [illegible] and

[illegible] with [illegible] - left less so,with scallop at [illegible] and

[illegible] with [illegible]

...a ... nucleus ellipsoidal with cross slit i... middle ... facies ... and buccal area.

3. ... n. sp.

... 1... ;p.7...,pl.... fig.13-16. ... III;p.135-139.

... 1... ;p.... 1... ... 1...;p.300.

... 1... ;p.... 1...,pl.... fig.... 1...

... 00;p.300-305,pl.... fig.1-25. ... 23;p.1700,Pl.1... fig.9.

... fig.30.

... ... 0,00-0,12 mm. ... 0,08-0,05 mm. ...

... ... body ellipsoidal;right leaf ... left one ... ...

[illegible] Zoöl. Biol. 30:p.307.

" " [illegible] 104:p.702,pl.xLII fig.24-26.

[illegible] of median [illegible] 0,1 mm. long.

[illegible] of [illegible] body overlapped at the anterior and somewhat [illegible] at the posterior side. Right leaf larger than left; at posterior [illegible] of the ventral [illegible] region protrudes a conical thorn-[illegible] of right leaf a longitudinal rib. This covers a part of the [illegible] from the fringe in longitudinal stripes, extending parallel to the [illegible] of the right side. Both ventral parts [illegible] into a small tube. Osculum, anal aperture [illegible] posterior [illegible] ventrally [illegible] at anterior end [illegible] the dorsal [illegible] at the posterior [illegible] thorn-like process.

[illegible]

S. [illegible] [illegible].

[illegible] Zool. 30:p.308,pl.1 fig.8-13. [illegible] 17.:p.33,pl.1 fig.7-9

[illegible]: Zeitschr. [illegible]. 30:p.300.

[illegible] 104:p.704,pl.xLII,fig.31-33.

[illegible] fig.8.

[illegible] 0,07 mm. long.

[illegible] of [illegible] body overlapped the [illegible] at anterior, posterior end also [illegible] at posterior. Left leaf [illegible] right the fringe [illegible] at the anterior end with a [illegible] at the posterior end with a small conical, [illegible] process. Left and pointed (lancetine) [illegible] shaped. On the left leaf one longitudinal rib. This covers a part of the ventral surface and its fringe in longitudinal stripes, extending parallel to the external margin of the right leaf. Right of the ventral side leaf the left leaf it [illegible] into a tube, surrounded by very [illegible] [illegible] apparatus. Two contractile vacuoles on ventral side along the [illegible] margin of the left leaf. [illegible]

[illegible]

[illegible]

a1. Family Onychodactylidæ Smits.

This family was established by Smits in 1904 for a very interesting salamander discovered by him and described under the name Onychodactylus. In addition to possessing the complete organization the single representative of this family possesses in very high degree the characteristics of the family system (vertebræ included) and is entirely distinct. This account satisfies me that it is not a case of the sub-family Hynobiinæ, constituting with the sub-family Onychodactylinæ the family Onychodactylidæ.

The Onychodactylidæ differ very distinctly from the representatives of Hynobiidæ 1)in the presence of an inner row of cilia, and 2)in the important circumstance that this ciliated fold does not entirely encircle the mouth cavity (as in the different representatives of the families Hynobiidæ, Amphiumidæ and Cryptobranchidæ), but ends in the anterior end of the mouth slit, some little distance behind its right and left angles, a short undulating membrane. Another Onychodactylus resembles on the one hand Amphiuma and on the other Cryptobranchus since it differs only in the absence of gill-slits and cilia of peritrichial epithelium. On this account I consider Onychodactylus to be of the transition form from the other Hynobiidæ to the other Cryptobranchidæ (Amphiumidæ), although I consider it best to retain for it the family Onychodactylidæ established by Smits.

1. Onychodactylus Smits.

a1.1. O. fischeri.

The body is long, nearly of uniform cylindrical thickness. The tail is cylindrical, somewhat compressed in the dorso-ventral direction anteriorly and laterally posteriorly. The head is short and broad, the tail elongated. The limbs are of nearly equal length. The right and left nostrils are separated, the left communicating with the anterior part

[illegible] a belt of [illegible] [illegible] [illegible]

[illegible] ~~to~~ undulating

about the longitudinal axis. A method of motion is active above, [illegible] by undulatory movements of the ventral surface when the objects are close together; usually only a detached cirri on its ventral surface when objects are close together; usually only a detached cirri on its ventral surface when objects are close together; usually only a detached cirri on its ventral surface when

[illegible]

[illegible]

[illegible]

II. Ciliated Infusoria.

III. Family Chilifera Autenrieth.

The [illegible] family Chilifera is characterized by a constantly open mouth [illegible] on the ventral side in the anterior part of the body. In the [illegible] is situated a [illegible] or two [illegible] undulating membranes. The [illegible] opens directly into the anterior or [illegible] undulating membrane. There is no peristome (with the exception of Cyrtostomum).

The form of the body is usually [illegible] oval, [illegible] of antero-posterior [illegible] or one end [illegible] the other, [illegible] [illegible] and rarely flattened. In most representatives the body is [illegible] or more or less [illegible] dorso-ventral direction and therefore appears relatively symmetrical and only in a few representatives does it appear asymmetrical [illegible] of an irregular development of both sides, or because the cuticle and (cortical and [illegible]) [illegible] is on one side.

Cilia usually cover the whole body, and only in the genus Protocruzia is the cuticle covered with cilia only on the ventral [illegible] of the body. Cilia are arranged in longitudinal rows and extend differently from the posterior to the anterior end. On the ventral side the cilia usually [illegible] form the posterior (lower) [illegible] of the oral opening, but the anterior [illegible] [illegible] and unite at an angle or [illegible] in a row [illegible] in the anterior part of the body. An [illegible] cilia occurs only in one genus, Loxodes, [illegible] in several representatives (Dysteria, Trachelius, Amphileptus, Lacrymaria [illegible], Urocentrum and Cyrtostomum) in the posterior end of the body there is attached a tactile cilium.

The mouth opening is placed in the anterior part on the ventral surface (only in Amphileptus [illegible] the middle of the body). In rapidly [illegible]

arising

twisted

a

2. Mouth or vestibule.

3. External margin of mouth [illegible] attached to it an undulating membrane.

4. External margin of mouth [illegible] lobe.

5. One undulating membrane attached to ventral wall of [illegible] oval.

6. One ventral [illegible] membrane [illegible] cilia [illegible] ventral undulating membrane to mouth; [illegible] 10. [illegible].

4. [illegible] external margin of mouth is [illegible] one or two (external) undulating membranes.

5. External undulating membrane in form of plastic loop [illegible] the esophagus an internal undulating membrane

6. [illegible] ventral or [illegible]

a little posterior.

7. [illegible] cilia.

5. Anterior undulating membrane attached [illegible] left, posterior end at right [illegible] mouth; internal undulating membrane has the appearance of a row of cilia.

11. [illegible].

5. External undulating membrane attached [illegible] left, anterior end at times also the posterior margin of mouth; internal undulating membrane in form of elastic loop. 12. [illegible].

7. Cilia cover only the ventral [illegible] of the body; external undulating membrane [illegible] anterior and right margin of mouth; internally

anterior

about

meridional

of small refractile particles,of irregular outline,the so-called excretory
granules.

The oral opening is placed on the ventral surface ,in a hollow and at
the end of a peristome,having the form of a longitudinal or spirally
twisted (Colpidium) tube. The oral opening is very small,round or oval,
but is rapidly made use of the ingesting food-grains. It leads direct into
the oesophagus of there is no special oesophagus.

In connection with the position of the anus there are no direct observations
on record. Probably it is placed at the posterior end of the body not
far from the place of attachment of the tactile bristle.

The contractile vesicle is placed at the posterior end of the body;it
opens terminally near the place of attachment of the tactile bristle.

The macronucleus is found in the anterior half;with the exception of
Colpoda (in which it is bilobed) the macronucleus is spherical,has a
rich covering and a fine-grained structure. Besides it there are sometimes
one (Paramecium) several and numerous micronuclei.

Conjugation occurs in all the fresh water,while some species are
found in soda (Colpoda cucullus),most others are found exclusively in brackish
(Colpidium colpoda) or salt (Colpoda duodenaria and Loxodes) water. They all prefer vegetable
infusions ,abounding in bacteria,some being exclusively found in pools
and not belong to the moving infusorians;usually living singly in one
another,but occasionally its cilia and undulating membranes,causes the
insects to jump,attract one to it ,its food. Its movements are generally
slow and accompanied by rotation about the longitudinal axis. It swims,
carrying the anterior end of its body always straight ahead,either in
large circles or in any direction,within it quickly changes or meeting ob-
stacles. The bristle attached to the posterior end of the body serves,it
would seem,as an organ of preception of the attack of its many
land - living enemies,who feed on them.

The food of Colpidium consists exclusively of bacteria,chromoco

[illegible] 17[illegible]-1703. Pl.[illegible] fig.1.

[illegible] fig.17.

[illegible] forms from 0,12-0,[illegible] mm. long and [illegible] -0,25 mm. broad.

Body ovoid,strongly flattened at the sides,and rounded at both ends; the anterior end bent to the ventral side.Ventral side convex,the central concave. On the ventral surface a peristome in the shape of a longitudinal furrow extending from the anterior end and occupying the anterior third of the body. Cilia in longitudinal rows from 8-10 on both sides.At the posterior end a tactile bristle in the direction of the longitudinal axis of the body.In the middle of the peristome:stomach, its contents attaining the entire circumference.No oesophagus. Contractile vacuole in the middle end of the body. Spherical myoneme with myonucleus lying under it in the anterior half.

Occ. from waters of Europe and Africa.

4. Urotricha farcta Clap.

[illegible] 167:[illegible].463-466.Pl.III fig.32-35.

Cyclidium farctum [illegible] 21:pp.1703-1705.Pl.XIV fig.7.

Pl.IV fig.38.

Small forms from 0,035- ,06mm. long and from 0,017-[illegible] broad.

Body ellipsoidal,slightly flattened at the sides;anterior half bent from right to left,so that the shape of the body is asymmetrical .On the ventral surface there extends from the anterior end a spirally curved [illegible]-like peristome,occupying almost the anterior third of the body. In the middle of the peristome is found an oblong-oval mouth opening,to which right and in is attached an undulating membrane. No oesophagus. Cilia are arranged in rows,extending spirally from the posterior toward the anterior [illegible]; on each lateral side there are from6-7. Contractile vacuole at the posterior end;near its opening is attached at an angle to the longitudinal axis a tactile bristle. The spherical macronucleus with the micronucleus lies [illegible] in the anterior half of the body.

Occ. European seas.

...if it is not the right side that opens on the ventral surface. The condition would be intermediate between Leucon and Nicippe. The condition would coincide with it in one large one.

...is the middle of the body; it is elliptoidal, ...with a ...structure. Beside it lies ...

...is found in both sexes and belongs to the rather rare ...ions. Its ...are not especially ...; it is ...usually, on one ...lateral sides, ...along the longitudinal axis, or, to ...more exactly, ...from one side to the other. With the aid of the ... ... gives rise to a rather strong ..., ...ing to it ... large ...ations. The mouth is also open and the ... ... into the oesophagus as into a ..., ..., surrounded by ... ... The outer ... with the ... ... appears as a sequel, in which the ... is included. Leu... is a typical ... and ... comparatively large ..., ... e.g. ... ... multiplication takes place in the free swimming condition and consists of cross division: This division is of the ... type. Besides this means of multiplication in Leuconoe there is also ... type of division, presenting a somewhat accelerated method. Namely ... ... and large individuals under unfavourable circumstances of existence (a lack of food supply ...) assume ... ..., and, with a ... degeneration of mouth opening and undulating membranes, they ... all ... into 8, 16 or 32 individuals by repeated divisions. These individuals ... very much from the external organisation. Besides their inconsiderable ... i.e. instead of the complicated mouth apparatus (oesophagus, undulating membranes) it has only a small slit. In this condition they ... a ... ability; after some time mouth and oesophagus are regenerated ... they finally turn into the typical Leuconoe, which begins to ... ... according to the investigations of Lampe. Degenerate but highly ... ... of Leuconoe enter into conjugation, though individuals with

[illegible] ...ciliate ...ciliate ...ciliate

[illegible] division. [illegible] indi-
[illegible] their [illegible] to each other.

[illegible]:

i.[illegible] [illegible].

[illegible] fig.47. [illegible] fig.4.

[illegible] fig.10-13.

[illegible] Pl.III.fig.16-21.

[illegible] Pl.II fig.7.

[illegible].

[illegible].

[illegible].

ii.[illegible].

[illegible].

[illegible] more slightly account of the small section on the [illegible] interior and a little narrowed,but the anterior enlargement ends evenly rounded. The dorsal surface convex,but the ventral flat; the mouth opening is placed at the middle.

[illegible] the lobes are arranged in longitudinal rows,extending meridionally [illegible] to the anterior end. On the ventral side [illegible] median ciliary stripes end at the posterior margin of the mouth opening,but the lateral stripes encircle it and unite by pairs in a low-shaped [illegible] the anterior wall of the lobes. The cilia are coarse,long and interspaced in the ciliary rows,close to one another.

The entoplasm consists of a very thin,transparent and homogenous layer. The entoplasm is flow-plasmal and contains many highly refractive particles. The mouth opening is placed in the middle of the ventral surface. It is oblong-oval and somewhat broader at the posterior than at the anterior. Along its left external margin is attached a narrow external undulating [illegible],encircling all the posterior margin and extending to a part of it

s on t

membrane

stop at

it

am

dim

in

bacteria

fig.7.

" pp.7-10,Pl.1,fig.7-13.

pp.177-178,Pl.x,fig.11-18.

" " .113-137.Pl.vii,fig.

.

.44.

.

" " .

" " .11-1.

.7.

" " .17,Pl.vi,fig.

.--1:.

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" " .1,fig.,Pl.iii,fig.-11.

" " 1:p.4,Pl.xvi,fig.7.

" " .1-1,Pl.ii,fig.10-11.

" " .1-,Pl.i,fig.1-1.

" " .

pp.-.

" .111-112,fig.10-11.

.1,Pl.i,fig.11.

.

.1.1,Fig.11.vi,Fig.1.i.ii,fig.7,177,Pl

,11-,.

.

.

ii. circumferential context.

The circumferential of the interior wall usually observed at the posterior portion also rarely reported. Both arcuate on the ventral side of the anterior part of the body, at the posterior end of the body it passes a small crescent shaped slit, within the anterior edge of the small crescent is a bit of line.

On the side of the [illegible] stripes, having a peculiar arrangement of the ventral side two slightly oblique convex to a line, ventrally [illegible] the main ventral, slightly to the right of forward [illegible] the [illegible] stripes, extending from the right of the [illegible] with [illegible] it has been seen to the posterior of it with the [illegible] stripes from the left of the [illegible] stripe [illegible] the anterior end of the body. The lateral portion of the [illegible] stripes [illegible] one of the [illegible] slightly [illegible] [illegible] the anterior and to the center of the body.

The [illegible] consists of [illegible] the [illegible]. [illegible] it has the [illegible] stripes also an [illegible] [illegible] of [illegible] [illegible] [illegible]. The anterior is [illegible] two [illegible] and slightly [illegible] portion.

On [illegible] it [illegible] on the ventral side to the [illegible] [illegible] [illegible]

refractive

relations

means

part

stripes

Anoplophrya lives parasitically in the mantle stripes of salt water Lamellibranchiata,attached by its anterior end to the mantles or gills. In water it swims quickly,but with pauses,and constantly rotates about the longitudinal axis. The food consists preeminently of bacteria,so that Anoplophrya appears properly speaking not parasitic,but only a messmate,living at the expense of the food obtained by its host.

2 species are distinguished:

1.Body broader at the anterior and flattened dorso-ventrally,mouth at the posterior end;oesophagus tubular;nucleus reniform . A.mytili.

1.Body narrowed at both poles and flattened from the sides;mouth in the posterior third of the body;tuft of tactile bristles at the posterior end;no oesophagus;nucleus ellipsoidal. A.veneris.

1.Anoplophrya mytili Quen.sp.

Taf.XX 157;pp.477-479 Pl.XX fig.15-17.

Synon.:Opalini mytili Quennerstedt 130;pp.4-5 Pl.I fig.1-3.

Anoplophrya mytili Kent 154;p.535 Pl.XXVI fig.26-27.

Pl.V fig.123.

Small forms from 0,035-0,07mm.long and from 0,02-0,025mm.broad.

Body oblong-oval,enlarged and rounded at the anterior and gradually narrowed at the posterior,also rounded end. It is strongly flattened in a dorso-ventral direction.The dorsal side is convex,the ventral concave.At its posterior end on the right margin is found a peristome-like deepening in which is placed the mouth opening,leading into a narrow tubular oesophagus. To the left,posterior and right margin of the peristome is attached an undulating membrane,having the form of a bag. Along the right margin of the body is a row of long (adoral) cilia,and at the anterior end a tuft of cilia,serving for prehension. The contractile vacuole is at the left in the posterior third of the body. The reniform macronucleus with spherical micronucleus beside it is in the anterior half of the body.

Hab. Gill stripes of Lamellibranchiata (Mytilus);occurs in Europe and Africa.

2. [illegible]

[illegible] 1907;pp.430-431 Pl.11 fig.13-15. [illegible] 23;pp.1703-1710 Pl.LXXI fig.1.

Synon.:Infusoire de l'Ostrea edulis.Carter55;pp.343-351 Pl.VII fig.11-12.

Pl.5 fig.124.

Small forms from 0,036-0,050mm.long and from 0,027-0,042mm.broad.

Body oblong-oval,narrowed and evenly rounded at both poles;strongly flattened at the sides.Right side convex and left concave.On the ventral surface in the posterior third of the body is found a peristome-like depression,in which is placed the mouth opening. There is no oesophagus. To the left,posterior and right margin of the peristome is attached an undulating membrane,having the form of a bag. From the anterior end of the body to the mouth opening extends a row of long (adoral)cilia;at the anterior end is a tuft of cilia,serving for prehension,and at the posterior a tuft of tactile bristles.The contractile vacuole is to the left in the posterior third of the body.The ellipsoidal macronucleus with spherical micronucleus lying beside it is in the anterior half of the body.

Hab. Gill strings of Lamellibranchiate (Venus gallina and ?Ostrea edulis); occurs in Europe and Africa.

5.Trichorpyponus Balt.

Pl. 5 fig.125..

Body oblong-oval,evenly rounded at the anterior end. The posterior end is provided with a conical,narrowed and also rounded process.

The whole body is covered with fine,thickly set,bristle-like cilia.To the posterior end,i.e. to the conical process, is attached a tuft of rather long tactile bristles. The ectoplasm consists of a very thin and homogeneous layer. The entoplasm is fine-grained and full of food.

The mouth opening is placed at the posterior end of the body at the base of the conical process. The structure of mouth and oesophagus has not been fully investigated. Probably to the external margin of the mouth open-

is attached an undulating membrane.

The contractile vacuole is at the summit of the conical process,in the posterior end of the body. The spherical macronucleus is in the middle of the body.

Multiplication takes place in the encysted condition.

Habitat in 10 species.

1.Trichorhynchus tuamotuensis Kahl.

Kahl.Ani 15;pp.52-53. Butschli 23;pp.1706-1707 Pl.LXIV fig.7.

Pl.V fig.125.

Very small forms about 0,04mm.long.

One described genus.

Hab.Foesh waters of Society Islands.

XIV .Family. Paramaecina Duj.

The family Paramaecina,to which at the present time only one genus is referred Paramaecium,is characterized by the presence of a rather large and deep peristome,beginning at the anterior end of the body and occupying a great part or the anterior third of the ventral surface.In the hollow of the peristome,at its posterior end,is placed the oblong-oval mouth opening,leading into a rather long,spirally coiled and gradually narrowing oesophagus;within the oesophagus i.e. along its walls,are attached two rows of closely placed cilia,having often the appearance of undulating membranes. Not less characteristic also is the ciliary covering of Paramaecium. Cilia cover evenly all the body and are placed on small papillae. The arrangement of the papillae depends on the peculiar hatching of the surface of the body,made by criss-cross lines. The anus is placed on the ventral side in the posterior part of the body or at the very posterior end. The one or two contractile vacuoles are surrounded by several radiating canals or secondary vacuoles. There is one nucleus. Food consists preeminently of bacteria.

The family Paramaecina was established by Dujardin in 1841, and con-

[illegible] of the most distinguished representatives of Peniculina. [illegible] ventral to this family, with Parameciums, some representatives of the family Colpidiidae typical of it, and also of the family Pleuronemina, Amphileptidae and Loxophyllidae. Early separated from this family Semidiscophrya and Pleuronemina, characterized by it only some Colpidiidae. Chatton and Lwoff-Lwoff instead of Parameciums introduced into their system Claparède's family Colpodidae, which in its composition they referred also various Holotrichs and Pleuronemina. Finally Stein restored Dujardin's family Paramecina and referred to it beside Parameciums some Colpidiidae, namely Colpidium also. Stein, and after him Butschli separated from the family Paramecina all Holotrichs except Paramecium, which quite fully deserves also the only genus of this family.

1. Paramecium Hill.

Pl.V fig.120-123, Pl.VII fig.169-170, 187, 192 and 202-204.

Body oblong-oval or fusiform, enlarged in the middle and narrowed at both ends; both ends uniformly narrowed and rounded (P.aurelia) or the anterior half of the body narrowed insignificantly and almost cylindrical in form, while the posterior end is more sharply narrowed, forming a kind of tail, rounded at the end (P.caudatum). In other species (P.bursaria and Putrinum) the body is oval, cut obliquely at the anterior end toward the ventral surface, and enlarged and evenly rounded at the posterior end. In those latter species at the anterior oblique cut anterior end is placed a rather considerable and deep pit-like hollow, the so-called vestibulum, occupying the anterior third of the body. In the depths of this vestibulum is placed the mouth opening. In other species (P.aurelia and caudatum) the vestibulum is at the anterior end of the body and occupies almost two thirds of the ventral surface. The oriental zone not sharply however as a straight pit, extending from the anterior backward, but somewhat curved, so that the anterior part of the body is slightly bent or curved from right to left.

The whole body is evenly covered with rather long and fine cilia. Oral

is [illegible] with short ciliary covering there is found at the posterior end of the body a tuft of rather long cilia. The cilia are placed on rather high protuberances or papillae, arranged in longitudinal, somewhat oblique, parallel rows. The bases of the ciliary papillae, instead of uniting with adjoining papillae, are marked by polygonal outlines, so that the line of their mutual contact has the appearance of a shallow furrow. Besides these, on the surface of the body the parameters of double furrows: longitudinal, extending from the posterior to the anterior end of the body and running somewhat spirally from right to left, and transverse furrows ascending almost perpendicular to the first. These mutually perpendicular furrows or stripes occasion a striping of the body, separating its surface into small rosettes, in the center of which are the cilia. Looking at the surface of the body with the highest power, it is not difficult to see that the longitudinal and transverse furrows appear as broken lines, bounding not rosettes, but small, slightly convex hexagons, with cilia in the middle. This seems the common arrangement of the ciliary stripes, but on the dorsal side they extend more or less meridionally, and on the ventral side the median stripes stop at the lower margin of the peristome, while the lateral ones elevate at an acute angle to the left and right margin of the peristome. Passing by the margins of the peristome, the furrows here [illegible] it and are arranged concentrically about the mouth opening, lying in the depth of the peristome.

The entoplasm consists of a definitely seen alveolar layer and a thin and homogeneous pellicle. The pellicle falls off rather easily from the body e.g. under action of absolute alcohol or soda. On such a separated or isolated pellicle the ciliary papillae stand out with especial clearness as also the hexagons, mentioned above. In the entoplasm lies a row of trichocysts, occurring in all species except P. putrinum. The trichocysts have the appearance of small cylindrical and highly refractive rods. They are arranged between the cellular alveolar layer perpendicular to the surface of the body; in some species (lein) noticably longer than the thickness of the

alveolar layer) they pierce at once and into the entoplasm and often,on account of the direction of the entoplasm,take irregular positions. On mechanical irritation,as a defense to the attack of a foe or by the action of some reagent (e.g. 1% acetic acid) the trichocysts with extreme rapidity shoot out and take the form of fine and long,thread-like rods. While the process of shooting out the trichocysts takes place with extraordinary rapidity,yet there has been no success in following the manner in which the trichocysts are thrown out.

The entoplasm is fine-grained,has a cellular structure and is found in constant motion (circulation). The circulation takes place in different species with different rapidity and goes on constantly in one direction. In the entoplasm there is included,beside food vacuoles,consisting usually of bacteria,many highly refractive granules.

Beside this in the perimeter of the entoplasm there occur special crystalline or irregularly outlined bodies,the so-called excretory bodies. They occur in varying quantities and not in all species,depending on the nature or,more probably, the composition of the food taken in. In light passing through them the excretory granules have a greenish-grey or greenish-brown color,and in reflected light,they are not transparent and are very gleaming. They refract light doubly and consist of acid phosphoric-acid calcium ($Ca_2(PO_4)_2$).They are formed in the food vacuoles in the form of very small grains or crystals and,on the excretion by the anus of the food particles,they fall into the entoplasm. Here they group themselves near the contractile vacuoles,are dissolved in the entoplasm and in a dissolved form (as acid salt $CaH_2(PO_4)_2$) are thrown out by the contractile vacuoles.

In one species (P.Lusaria) in the entoplasm there occur living with it symbiotically one-celled algae,Zoochlorellae.These zoochlorellae are at times so numerous and so fill the body,that the entoplasm,nucleus,food vacuoles and other things enclosed are quite invisible. Zoochlorellae occur often (but by no means in all specimens) in P.Lusaria,while in other species

(... the genus Stylina P.griffinus) they are absent.

The mouth opening is placed on the ventral side at the posterior end and is the region of the peristome. It has an oblong-oval or subcircular-ovoid outline, enlarged by the anterior and narrowed at the posterior end.The left margin of the mouth opening is convex,while the right is provided with a conical cirrus.Along all the external margin of the mouth opening are attached cilia,not different from the cilia covering the body.They are on small papillae,so that the margin of the mouth opening appears toothed or crenate. The mouth leads into a rather long tubular and at the end funnel-like narrowed pharynx. The oesophagus is slightly coiled spirally or zigzag-like and takes its way obliquely to the right and back. To its lateral wall,running from the anterior end of the mouth opening and quite to the posterior end of the oesophagus is attached a thin plastatic edge of irregular outline,whose free margin like a fringe has broken into separate short cilia,but the end passed at the end of the of the oesophagus into a single tuft or plume of long and fine cilia. This formation,presenting a sort of mesium between a row of closely set cilia and an undulating membrane,has probably arisen through the partial union or growing together of one row of cilia:then the bases of the cilia unitily formed a plastic edge but the free end appears as short cilia. This supposition is confirmed by the observation that in some specimens the plastic border is crenated and in others it breaks up into separate plastic bodies. Along the ventral wall of the oesophagus is attached just such a plastic lateral,but ventral and lower,whose free margin like a fringe is broken into separate cilia.These relations in the oesophagus are very difficult to distinguish, the more so that the oesophagus leads into the body not straight,but in a s row-like manner.

The anus appears as a small round opening and is visible only at the time of defaecation. It is placed on the ventral surface:in P.aurelia and caerulea near the posterior margin of the peristome,in P.cuticina near the posterior end of the body,and in P.lurensis at the very posterior pole.

In the majority of species there are two contractile vacuoles,though in P.putrinus only one. In the latter case it is placed usually in the middle of anterior half of the body,near the right side. When there are two vacuoles,one is placed in the anterior,the other in the posterior third of the body and also near the right side. The contractile vacuoles open outside, in the latter case by means of a clearly defined excretory opening. From this small opening there extends within the body a small canal,which passes through all the alveolar layer and reaches to the contractile vacuoles lying little, lower on the boundary of the ecto- and entoplasm. At the time of the growth of the vacuole,i.e. during the systole,the excretory canal is closed by a thin plasmatic wall. The contractile vacuole is surrounded by several small secondary or radiating canals in P.putrinus and in the rest of the species by some (about 5) radiating canals pyriform in shape,situated like rays about the vacuole. At the time of diastole the radiating canals gradually increase,swelling at the end,which is directed toward the contractile vacuole. When they reach the maximum size,systole of the chief vacuole takes place,destruction the plasmatic wall separating the vacuole from the excretory canal breaks down and the contents escape through the excretory canal and opening. At the same time the radiating canals of secondary vacuoles unite in one new vacuole. For a moment after the union of the radiating canals in the new vacuole,they vanish and soon reappear in the form of fine hyaline rays,which gradually take a pyriform. The two contractile vacuoles discharge at the same usually interchangably,i.e.while systole takes place in one,diastole takes place in the other.

The macronucleus is placed usually in the middle of the body and only in P.putrinus does it occur at times in the posterior half. It has an oblong-ellipsoidal or somewhat reniform form (P.putrinus) and is surrounded by a thin,unstructured envelope. Its structure is fine-grained,while in the centre of the nucleii lie small,highly refractive and intensely coloured bodies.In P.caudatus occur in the nucleus sharply defined spherical bodies

[illegible] with one light colored contractile vacuole which [illegible] to the anterior end of the buccal cavity. Very close to the macronucleus lie 1 or 2 micronuclei; the micronucleus lies usually in a small hollow of the macronucleus to which it is closely applied. The two micronuclei occur only in P.aurelia and constitute the characteristic mark of this species; in the other species there is always one micronucleus. In P.caudatum it is ellipsoidal or spherical and entirely homogeneous. In P.putrinum and P.aurelia it is ellipsoidal and in the latter species is distinguished by its size. In these two species the micronuclei consist of two divisions; a smaller, transparent, homogeneous and achromatic, and a larger, cross-striped, chromatic one. These two divisions are seen especially in [illegible] also in living specimens. The micronucleus of P.aurelia is [illegible] and consists of a central, spherical, less chromatin body, surrounded by a peripheral structureless achromatin layer.

Paramoecium occurs in salt and fresh water and belongs to the most commonly known infusorians. Feeding on bacteria, they easily endure and even prefer stagnant water multiplying in it in fabulous numbers. Their movements are rather quick, and the anterior end constantly traces the least. They move backwards also quickly and skillfully but usually for a short distance. When swimming very quickly they rotate about the longitudinal axis, while when swimming slowly they sway constantly from one side to the other. often they lie almost entirely motionless, usually near a plane of bacteria or a large collection of bacteria. An interesting phenomenon appears, if they remain quietly under the cover glass: after some time they range themselves in a row (up to 20 together) and lie entirely motionless, slowly swaying from time to time from one side to the other. Food consists almost exclusively of bacteria. Only P.aurelia feeds not on bacteria, but on one-celled algae, flagellata and other micro-organisms. Lately it has often happened to me to find in the body of P.caudatum plant algae, serving it as food. The food is drawn into the mouth opening by the vortex called out by the undulating cilia covering the peristome. Falling into the mouth, the [illegible]

teria, a mass of the originating cells, found in the resorbing, near to its end and being surrounded by a row of cells are gathered in a mass. Attaining a definite size, the food with the bacteria enclosed in it separate from the resorbing and appear in the entoplasm in the form of the so called food vacuoles. On account of the circulation in the entoplasm, it is moved and turned about through the whole body. Digestive apparatus and the food bacteria contents gradually pass and pass, and the vacuole (also of liquid) increases in size. At the same time in the food vacuole there appear small crystalline of irregular outlined bodies, the so-called excretory bodies. Finally the food vacuole approaches the surface and the food remains are thrown out while the excretory bodies left with the entoplasm only by dissolving in it, are excreted by the contractile vacuoles.

The body of Paramecium is elastic, very supple, but not contractile. Usually it is colorless and only in some specimens colored yellow or gray, depending probably on the kind of food taken in.

Multiplication takes place in the free-swimming condition and consists of cross division. When dividing a new mouth opening and pharynx is formed in the peristome independent of the old mouth. Then the macronucleus is stretched out in length and takes an oblong fibrous structure, while the micronucleus divides karyokinetically. New contractile vacuoles appear and cross partitions, which, gradually going deeper divide the body of the infusorian into two equal halves. The conjugating individuals attach by the peristomes or mouth openings so that the entoplasm is absorbed at the place of attachment, i.e. in the anterior part of the body. In this condition there takes place the exchange of the separate micronuclei, after which the individuals separate and begin energetically to divide. The change, arising at the time of conjugation in the macro- and micronucleus, is accomplished in the 4 species in various ways; this even determines the disunion of some species, from the morphological point of view very similar. Cysts have not to the present time been discovered and it is possible that encysting does not occur, because

[illegible] of the posterior [illegible] of unfavorable conditions
or existence as well as also the means diffusing the special bodies pe-
culiar.

[illegible] are distinguished, not counting [illegible] rather doubtful [illegible]
[illegible] species.

1. [illegible] S. [illegible]-coeli: narrowed and running at both ends; tissue [illegible]
[illegible] in length.

2. [illegible] S. [illegible]: spherical [illegible] S. aurelia.

3. [illegible] S. [illegible]: spherical, posterior conical; at the posterior end
a ball of ellipsoidal [illegible]. S. caudatus.

4. [illegible] S. [illegible], chiefly at the anterior end enlarged at the poste-
rior end; [illegible] anterior half of the body.

5. [illegible] S. [illegible]: [illegible] S. [illegible].

6. [illegible] S. [illegible]: [illegible] S. [illegible].

7. [illegible] S. [illegible].

[illegible] 171, p. 64.--173; p. 69, Pl. III, fig. 1-14.

[illegible] 02; pp. [illegible] 3, 64, 65 and 66.--03; [illegible] 3, 13, 14.--04; pp. 172, 175, 179,
[illegible] Pl. III, fig. 1.--05; pp. 145, 164, Pl. 1, fig. 10.--06; pp. 359-361, Pl.
[illegible], fig. 6.

[illegible] 671 pp. 422-423, Pl. VIII, ff. 5-6. Diesing 65; pp. 145, 342.--59; pp. 50-51
[illegible] 164; p. 118, Pl. 8, fig. 1-3. [illegible] 7; p. 45. [illegible] 45; p. 425, Pl. LIII,
fig. 1-4.

[illegible] 213; pp. [illegible] 240-245.--215; pp. 57, 58, 61-62, 77, 81, [illegible] 97-101.--218;
p. 55.--221; p. 60.--226; pp. 3, 4, 51, [illegible] 41-44, 47, [illegible] 53, 54-59, 65, 67,
70-72, 82-84, 88-89, 115-116, 121.

[illegible] 13, 14, 15, 20 and 24.

[illegible] 02; pp. 115-118, [illegible] Pl. VI, ff. 1-3.--03. [illegible] Pl. [illegible].
[illegible] and Landmann 04; pp. 4-5, 54-55, 253-256; Pl. II, pp. 1-2, 252,

[illegible]

[illegible] pl.[illegible]

[illegible] pl.[illegible]

[illegible] pl.[illegible]

[illegible] pl.[illegible]

[illegible] pl.[illegible]

[illegible] pl.[illegible]

pl.1 fig.1-11.

[illegible] and large [illegible] and [illegible]

[illegible]

[illegible] -oval, [illegible] in the middle and uniformly narrowed at both [illegible]. On the ventral side a large and broad [illegible] extending from the anterior end and occupying 2/5 the length of the [illegible] and of the body slightly twisted from right to left. The [illegible] body surface covered with cilia. In the alveolar layer a row of trichocysts, [illegible] along-axel at the end and in the depths of the peristome. Oesophagus tubular, long and curved in screw fashion - in it two rows of cilia. Near pt ventral surface not far from the anterior margin of the peristome. Two contractile vacuoles in the anterior and posterior half of the [illegible] ventral [illegible], vacuole stronger radially, ellipsoidal macronucleus in the middle of the body; beside it lie two spherical micronuclei consisting of a central chromatin body and a bright projection layer.

Syn. From [illegible] in all parts of the world and [illegible].

Paramecium caudatum Ehrg.

[illegible] pl.[illegible] fig.2.--[illegible] pl.[illegible] fig.7.

[illegible] pl.[illegible] fig.7. [illegible]

[illegible]

[illegible]

[illegible]

" " Party 161;p.14c.

" " Dinning 65;pp.151,240.--6[illegible]

" " [illegible] and Time 0,[illegible]

[illegible] ...ventral side ... [illegible] ...anterior. On the ventral side ... [illegible] ...the anterior ... [illegible] ...slightly twisted ... [illegible] ...cilia. ... [illegible] ...follow ... [illegible] ...tion, its cells ... [illegible] ...the body. ... [illegible] ...of body surrounded ... [illegible] ...ventral ... [illegible] ...contains ...

[illegible]

[illegible]

11-18. Stein 22o:pp.[illegible].

[illegible] 127:p.180-185,Pl.V,figs.52-62.Maupas 164:pp.235-238.

[illegible] 140:p.219.

[illegible] Pl.V figs.[illegible].

Body forms from 0,12-0,14mm.long and 0,05-0,07mm.broad.

Body oval,oblique and rounded at the posterior end and obliquely cut at the anterior. On the ventral surface a large and broad ciliferous peristomial margin, the external limit of the body; anterior and posterior from right to left. The whole body evenly covered with ciliation, trichocysts and [illegible]. Again at the notch of the peristome leads into a tubular pharynx curved in some individuals, its walls ten rows of cilia. [illegible] the ventral side near the posterior end of the body. One contractile vacuole, surrounded by several small radiating or secondary vacuoles in the anterior or middle of the body (at times 2 contractile vacuoles,but rare, surrounded by small secondary vacuoles,but not by radiating canals). Macronucleus reniform (rather ellipsoidal) in posterior half of body; in a hollow of it is placed the ellipsoidal micronucleus,consisting of a homogenous and achromatin part and a coarse strand. Chromatin [illegible].

[illegible] Fresh water of Holland,Belgium and Luxemburg and European [illegible].

[illegible] Urocentrina Clap.and Lachm.

The family Urocentrina,consisting of only one representative Urocentrum turbo,is characterised by its ciliary covering.Cilia do not cover all the

[illegible] the [illegible] [illegible] [illegible]

[illegible] the oesophagus,the kystevis, results of the action of the cilia of the oesophagus,situat in a pair at its posterior end. Either [illegible] the oesophagus with it introduced,which does not [illegible] the oesophageal canal at the end of the oesophagus,emitting the secretion.Then the cord vacuole has attained a considerable size, it separates from the wall of the oesophagus,forms a spherical form and remains in the ectoplasm.

Multiplication takes place in the free swimming condition and consists of equal division (see part I,p. 37). Then conjugating individuals attach [illegible] the ventral surfaces,as is usual with infusorians,and by the enteroplasmic,i.e.by that part of the body,which lies anterior to the anterior end of cilia. At the place of union the ectoplasm is dissolved and the endoplasm of both the conjugating individuals mixes,i.e. there takes place a [illegible] division,by means of which the food vacuoles of one individual are carried over into the other.

A single parasite:

I.Prorocentrum Lima O.F.Müll.sp.

[illegible]

[illegible]

[illegible]

dorsal

caste

During

right

vacuole

1. [illegible] with cilia; one tactile [illegible]
2. [illegible]-cell, with rounded nucleus [illegible]
3. [illegible] with crescent [illegible]
4. [illegible] and [illegible] [illegible]

The left margin of the peristome is provided with a scallop in the posterior part,the right is crescent shape. The cilia are arranged in meridional rows,thicker at the anterior end than at the posterior;1 tactile bristle at the posterior end of the body. Along the left,posterior and part of the right margin of the peristome is attached a big-like undulating membrane;along the right margin a row of cilia. The mouth is in the cilia of the peristome,near the left margin;there is no oesophagus. The anus is at the posterior end of the body on the ventral side,near the bristle;also is the contractile vacuole. The spherical makronucleus with the spherical micronucleus beside it is in the center of the body.

Hab. Fresh waters of all parts of the earth and European seas.

2.Dyslitum citrullus Cohn sp.

Cohn 41a;p.5-6,Pl.XVII,fig.6a. Lees 192;pp.12-13,Pl.XVI,fig.6.
Maupas 165;pp.260-261. Schlius 170;p.102.
Wenrich 177;pp.3-34,Pl.VII fig.33.

Synon.:Loxodes (Lipsum) citrullus.Cohn 45;pp.276-277,Pl.XV,fig.6
Pl.V fig.134.

Body small in size from 0,035-0,042mm.long and 0,018-0,02mm.broad.

Body oval,rounded and enlarged at the posterior and strongly narrowed and cut off straight at the anterior end;the latter provided with a scallop on the dorsal side. The dorsal surface more convex than the ventral. On the ventral side is a long peristome,whose left margin is provided with 2 scallops and the right with one. The cilia are arranged in meridional rows,thicker at the anterior end than at the posterior;1 tactile bristle at the posterior end of the body. Along the left,posterior and posterior part of the right margin of the peristome is attached a large big-like undulating membrane;along the right margin a row of cilia. The mouth is in the hollow of the peristome,near its left margin;there is no oesophagus.The anus is on the ventral side at the posterior end of the body,near the place of attachment of the tactile bristle;not far from it is placed the contractile vacuole. The spherical makronucleus with the

right

not

terior end of the body (B.bursaria).The anterior end of the body is cut obliquely in the direction of the ventral surface and more or less strongly bent toward it.The dorsal surface is more convex than the ventral.On the ventral side in the anterior part of the body is placed a small peristome, having the appearance of a not specially deep pit,somewhat covered at the anterior part by the bent anterior end of the body.The left margin of the peristome is provided with a scallop,while the right forms a straight line.

The whole body with the exception of the peristome,is covered with cilia arranged on small protuberances or papillae. Shey are arranged in longitudinal rows and cause in B.minutus and busaria a longitudinal striping of the body.The ciliary stripes extend meridionally from the posterior to the anterior end of the body;on the ventral side the median stripes stopat the lower (posterior) and often at the left margin of the peristome,while the lateral ones encircle the peristome and unite in bow-shape in the anterior part of the body where it bends to the ventral side.In B.elongatus longitudinal stripes are not visible.The ciliary covering is very variable in different species:in B.bursaria the body is evenly covered with short, fine and thickly set cilia;in B.minutus the cilia are long,bristle-like and at the anterior end of the body are much thicker than at the posteriq while the anterior ones are usually curved to the ventral surface;finally in B.elongatus the cilia are also long,bristle-like,but are very far apart and only at the anterior end of the body cover it a little more closely.

The ektoplasm consists of a thin,transparent and homogeneous layer,or of an alveolar layer and a very thin pellicle (B.busaria).The entoplasm is fine grained and contains many highly refractive particles.

The mouth opening is small and lies in the hollow of the peristome at the posterior end,somewhat near its left side.There is no oesophagus or it is in appearance small and extremely short,cylindrical tubular (B.bursaria).Almost all the peristome is covered with a bag-like undulating membrane,attached along the left,posterior (lower) and right margin of the peristome (B.minutus),or extending only to the middle of the left (B.bur-

...material on right margin of the vestibule. E.sinuatus.

2.Cilia on the undulating membrane along the left,posterior and posterior wall on the right margin of the peristome. E.elongatus.

1.Body oval,without tail at posterior end;short cilia covering all the body;undulating membrane along right,posterior and posterior wall on left margin of the peristome. E.lucretia.

1.Colpidium sinuatus Dunn.

...Protozoa 1931;pp.84-85.Pl.VII fig.99-101.--1935:p.99.

...:Epistylis sinuata.Stokes 1896:pp.183-184.Pl.VI fig.1.

Pl.VI fig.138.

Very small forms from 0,024-0,028mm.long and 0,009-0,012mm.broad.

Body oblong-oval,narrowed and rounded at both ends; the ventral surface less convex than the dorsal. From the right the body is narrowed in the anterior end;the anterior and is bent to the ventral side and covers a little the small pit-like peristome,whose left margin is furnished with a membrane. Cilia-like cilia are arranged in longitudinal rows and are thicker towards the anterior end. The mouth opening is small in the bottom of the peristome; along the left,posterior and right margin of the peristome is attached an undulating membrane,having the form of an asymmetrical bag.The anus is at the posterior end of the body,and not far from it the contractile vacuole opens outward, on the dorsal side. The spherical macronucleus with spherical micronucleus near it is in the middle of the body.

Hab.:Fresh waters of Europe,America and Sandwich Island .

2.Spirostomum elongatus Schew.

...Protozoa 1931;pp.86-87.Pl.IV fig.50.--1935:p.81.

Pl.VI fig.139.

Very small forms 0,03mm.long and 0,01mm.broad.

Body oblong-oval,narrowed and rounded at the posterior end. The anterior end is obliquely cut in the direction of the ventral side and bends towards it,covering a little the pit-like peristome,provided with a membrane on the left side. The cilia-like cilia are arranged far apart and are a

the longitudinal axis. In the cells of this peristome furrow is found the most conspicuous and a long slender organelle, completely resembling a cilium. But less characteristic is the ciliary covering of the peristome furrow: The ciliary strips bend into it and are in its very bottom, while the cilia are in furrows somewhat closer together than on the surface of the body, generally, as it were a transition to the undulating plasma lamella which is the peculiarity of Spirotricha.

In consequence of these peculiar organisms, I consider it also to separate the genus Blepharisma from the family Stentoridae, to which Stein and Bütschli placed it, or Schiller, whose Entorhipidae placed it, on the basis of finding a sort of undulating membrane in the oesophague, therefore I consider as peculiar the family Blepharismidae. For institution of a special family seems to me the more unobjectionable by the structure of its organisms, by the arrangement of its cilia, as also by the structure of its nucleus, as compared as it were a transition to the family Plagiotomidae (Spirotricha Heterotricha Inferiora), often to the Trachelidae united out.

Blepharisma Stein.

Fl.II Fig.14I.

Body ovate-oval, sometimes a little cylindrical at both ends. The anterior end more strongly arranged than the posterior slightly bent to the ventral side. The dorsal surface is convex, but the ventral almost flat or slightly concave. On the ventral surface in the anterior part of the body is placed a rather long transverse-oval peristome furrow, distinct from the flat also a little obliquely directed and passing almost to the median line of the ventral surface. The mouth of this peristome furrow protrudes rather strongly, but the anterior-external margin is slightly inflated, forming a sort of lip, not to cross section = nose, - but the whole furrow appears notably at the living and at the anterior end of this peristome is placed the mouth opening.

The whole body is richly provided with rather long and fine cilia, which in longitudinal furrows. The arrangement of the longitudinal ciliary

stripes

S

Chilodontidae Kahl. Isotrichinae Butschli.

In the tentacle bearing ciliates the cytostomal aperture is not terminal, i.e. the first and second stomites of ciliates are not in the anterior end of the body, and the first ciliary covering.

The body is ovoid, flattened a little dorso-ventrally, narrower at the middle and rounded at the posterior end. The mouth opening is placed at the ventral side near the anterior end of the body (Isotricha prostoma and longistyla) or in a special depression in the posterior third of the body (Isotricha intermedia).

The arrangement of the ciliary system is characteristic, encircling the whole body and passing anterior to it at an acute angle, forming the peristomial field, extending along the median line of the ventral surface from anterior end of the mouth opening, quite to the anterior end of the body. The basis of this arrangement of the ciliary system, corresponds with their arrangement in other Infusorians Butschli, and his view of the body as representatives of this family in such a way that the ciliary while the mouth opening is ventral, they designate as the posterior end of the body.

The cuticle consists of an alveolar layer and a thick pellicle. The cortical plasma has a cellular structure.

The mouth opening is placed at the posterior end and leads into a funnel-shaped or calyx-shaped oesophagus, tube (Isotricha) or covered with cilia (Isotricha). The anus is placed at the anterior end of the body.

The contractile vacuole is found at the posterior end of the body (Isotricha); Dasytricha several contractile vacuoles are grouped in the middle of the body.

The macronucleus with the small hyaline nucleus placed in a hollow of it is found in the posterior or middle of the body. In Isotricha it is attached to the wall of the body by means of special plasmic formations.

the complete muscle attached.

The family Isotrichina was established by Stein in 1859, to include the two genera the only cilia representative Isotricha in different position. This family was, however, not accepted by Stein, but was included with other families in the family Holotricha, and was not mentioned again, Stokes and others in the family classification. The family Isotrichina is extremely little in number and presents a very close resemblance to the genus Dasytricha Entodinium. Isotricha was included only by Stein, the latter genus, on the basis of its final investigations, of the family Isotrichina, through the two genera of the genus Dasytricha (Entodinium and Diplodinium) especially in the non-contractile of the observations which including plastic [illegible] the possibility of the genus Isotricha, I could of their normal characteristics the other species of Isotricha. In any event Isotrichina reveals a very close relationship to Dasytricha. In general to the family Diplodinium especially as it does a distinction in these forms.

The family Isotrichina consists of 2 genera:

Cilia [illegible] the genus of Isotricha.

1. Cilia, short, [illegible] covered with cilia; [illegible] continuously changing in the cilia of the [illegible] attained by [illegible] plastic stages to the last stage. Isotricha.

1. Cilia short in some [illegible] contractile vacuole at posterior extremity. Dasytricha.

Isotricha Stein.

Isotricha Stein, 1859, p. 174.

Body [illegible] ovoid, narrowed at the anterior end anterior of the posterior end, [illegible] a little more [illegible] (i.e. [illegible] the ventral is [illegible] of the cilia. In some the anterior the ventral is less [illegible] or less entirely [illegible] that the body appears slightly flattened in a dorso-ventral direction. Isotricha the ventral surface is fur-

[illegible] the cytotomy canal are slowly torn only at the time of separation,while in normal division take up the appearance of a tight girdle or tube as it left at the equator.The tension of the cortex at the activity end of the body is somewhat stronger,whence the less tonal for orientation of the body into it,especially toward it is confirmed by the direction of the plasma as well as the currents of fertilen.

The contractile vacuoles are several,without exception all the species,but concentrated especially in the apical.Their vacuole opens laterally by [illegible] canal (canal excretoire).

The macronucleus [illegible] in the posterior half of the body as in [illegible], irregular [illegible] of one end or oblique at the opposite quarter in flat-[illegible].In a [illegible] of the micronucleus is about the rest [illegible] spheroidal.The nucleus of Infusoria presents a peculiarity, not occurring ([illegible] the exception possibly of Ophryoscus) in the [illegible] Infusoria,that[illegible] nucleus does not lie free in the protoplasm, but is attended by two or three clear vacuoles to the external wall of the body,i.e.to the ectoplasm.The nature of these vacuoles [illegible],as actually [illegible] does not yet [illegible].

Locomotion takes [illegible] in the fluids (water and solution) of [illegible]. Its direction is very quick and accomplished by rotation about the longitudinal axis.That [illegible] the anterior (external) motion [illegible] pushes the body constantly [illegible] the head. Multiplication takes place in the [illegible] position and consists of [illegible] division and [illegible] have not been observed.

The [illegible] of [illegible] are not [illegible] as to the present. In the [illegible] of the most recent investigations of [illegible] it is very probable,that they [illegible] to the host to show they are [illegible] [illegible] vitality and excitability [illegible] the [illegible] when they separate and return to the host. Infection also is not proven.Probably the [illegible] are very [illegible] [illegible] cysts

.. insecta intestinalia alata.

Linn. Syst. Nat. ed. 10. p. 815. Degeer. Ins. tom. VII. pl. XVII. fig. 27.

Geoffroy. Ins. Par. tom. II. pl. III. fig. 10.

Retzius. Ins. pl. III. fig. 12 a.

Fabricii. Ent. Syst. tom. II. pag. 377-379. Pl. XVIII. fig. 26.

Illig. Mag. tom. II. pag. 179.

Habet os edens sine ore. Oculos duos. Larva et Chrysalis.

Ord. Diptera-Antliata + Illig. At the antennae are called of the
applied one. At the ventral surface is the position part of the body in
a small section, also is the [illegible] with [illegible].
[illegible] and of the body. This the body [illegible]
[illegible] the [illegible] and the [illegible]
[illegible] (with [illegible]) to the body [illegible].
[illegible] the [illegible] like the oval [illegible].

.. [illegible] (with one [illegible]) of [illegible], [illegible],

.. [illegible].

.. [illegible].

.11.11 [illegible].

[illegible] the [illegible] and [illegible], at
[illegible] [illegible] [illegible] and [illegible] to the
[illegible]. [illegible] [illegible] [illegible] a [illegible]-[illegible]
[illegible]. [illegible] [illegible] the [illegible] [illegible].

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

def. ter

said

[illegible] of Lankesteria and Opalina. In these genera they are [illegible] in one or two rows the whole length of the body. In Discophrya and some species of Anoplophrya (A. nucleata) instead of contractile vacuoles there are [illegible] a long contractile canal occupying almost all the length of the body, opening by one or several openings.

In a majority of Anoplophryidae there is but one micronucleus; only in Conchophthirus and most of the species of Cyclochaeta there are a large number of micronuclei, although in the early condition there is always one micronucleus. The macronucleus has usually an oblong-cylindrical or ribbon-like form and occupies most of the length of the body. Only in a few representatives is it bifurcated or moniliform or consists of two lobes united by a bridge. The micronucleus is less often met with, chiefly only in the species of Anoplophrya.

Nutrition [illegible] the parasitic life of life and with the exception of Lankesteria [illegible] exclusively endosmotically on the cells of intestines, all are chlamydozoic. Nutrition is accomplished by endosmosis of all the surface of the body. Multiplication takes place in the free-existing condition and consists of cross division or of an encystment taking place at the posterior end of the body and giving rise to the formation of a conglomerate of individuals. Encysting and conjugation have been observed in only a few representatives.

The family Opalinina was established by Stein in 1867, on the basis of the previously known genus Opalina and other genera Anoplophrya, Conchophthirus and Discophrya discovered and described by him. This family existed without doubt in other systems also with this difference, that to it was often added a new genus Opalinopsis, discovered by Fontinger (Lankesteria).

At present the family Opalinina consists of 5 genera.

Table for determining the genera of Opalinina.

1 (2) Body covered with contractile vacuoles or a longitudinal contractile canal.

2. Without suckers or hooks or internal tube-like system of contractile vac-

there is

Very [illegible] from C.1-C.3mm. long.

[illegible] the [illegible] of the anterior and posterior [illegible] of the [illegible], also [illegible] [illegible] a little curved. [illegible] is [illegible] in the [illegible] region, [illegible] very closely together; at the [illegible] and [illegible] the [illegible], [illegible] a cord of fairly [illegible] [illegible] (level E2) not [illegible] in one row, all the [illegible] [illegible] [illegible] about 40 for [illegible] of the [illegible] [illegible] [illegible] of the [illegible].

Ind. [illegible] of [illegible] [illegible] [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

1. [illegible] ar

O; [illegible].

" "

" [illegible].

" [illegible].

[illegible].

[illegible].

[

intestinalis

370-373.

r.--plasmatic ring of peristomal apparatus

[illegible]

Fig.1. [illegible] 200.

Showing area Fig.2-Fig.18.

Fig.2. [illegible] Fig.3. [illegible] 400.

Fig.3. [illegible] Fig.4. [illegible] 400.

Fig.4. [illegible]

Fig.5. " " [illegible] Fig.6. [illegible]

Fig.6. " [illegible] Fig.7. [illegible] 400.

Fig.7. " " [illegible]

Fig.8. " " [illegible] 400.

Fig.9. " [illegible] " [illegible]

Fig.10. " [illegible] 400.

Fig.11. " [illegible] Fig.12. [illegible]

[illegible] for Fig.12-20.

Fig.13. [illegible] Fig.14. [illegible]

[illegible] in Fig.13.

Fig.15. [illegible] Fig.16. [illegible] 300.

[illegible] in Fig.15.

Fig.17. [illegible] 400.

Fig.18. " [illegible] Fig.19. [illegible] 400.

Fig.19. " [illegible] Fig.20. [illegible] 400.

Fig.20. " [illegible] Fig.21. [illegible] 400.

" 170. [illegible] ..:Assessment of [illegible] and [illegible] strikes, and also military rebellion. pg.[illegible].

" 171. [illegible] ..:Assessment of [illegible] pg.[illegible].

" 172. [illegible] ..:Assessment of [illegible] and [illegible] pg.[illegible].

" 173. [illegible] ..:-[illegible] pg.[illegible].

" 174. [illegible] ..:Assessment of [illegible] pg.[illegible].

" 175. [illegible] ..:Assessment of [illegible] pg.[illegible].

" 176. [illegible] ..:Assessment of [illegible] pg.[illegible].

" 177. [illegible] ..:Assessment of [illegible] pg.[illegible].

" 178. [illegible] ..:Assessment of [illegible] pg.[illegible].

" 179. [illegible] ..:Assessment of [illegible] pg.[illegible].

" 180. [illegible] ..:Assessment of [illegible] pg.[illegible].

" 181. [illegible] ..:Assessment of [illegible] pg.[illegible].

" 182. [illegible] ..:Assessment of [illegible] pg.[illegible].

" 137. [illegible] (Continuation of preceding) [illegible] 1070.

" 138. [illegible] (Continuation of preceding) [illegible] 1071.

" 139. [illegible] (Continuation of preceding) [illegible] 1072.

" 140. [illegible] (Continuation of preceding) [illegible] 1073.

" 141. [illegible] (Continuation of preceding) [illegible] 1074.

" 142. [illegible] (Continuation of preceding) [illegible] 1075.

" 143. [illegible] (Continuation of preceding) [illegible] 1076.

" 144. [illegible] (Continuation of preceding) [illegible] 1077.

" 145. [illegible] (Continuation of preceding) [illegible] 1078.

" 146. [illegible] (Continuation of preceding) [illegible] 1079.

" 147. [illegible] (Continuation of preceding) [illegible] 1080.

" 148. [illegible] (Continuation of preceding) [illegible] 1081.

" 149. [illegible] (Continuation of preceding) [illegible] 1082.

" 150. [illegible] (Continuation of preceding) [illegible] 1083.

" 151. [illegible] (Continuation of preceding) [illegible] 1084.

" 152. [illegible] (Continuation of preceding) [illegible] 1085.

" 153. [illegible] (Continuation of preceding) [illegible] 1086.

" 154. [illegible] (Continuation of preceding) [illegible] 1087.

" 155. [illegible] (Continuation of preceding) [illegible] 1088.

" 156. [illegible] (Continuation of preceding) [illegible] 1089.

" 157. [illegible] (Continuation of preceding) [illegible] 1090.

" 158. [illegible] (Continuation of preceding) [illegible] 1091.

" 159. [illegible] (Continuation of preceding) [illegible] 1092.

" 160. [illegible] (Continuation of preceding) [illegible] 1093.

" 161. [illegible] (Continuation of preceding) [illegible] 1094.

" 162. [illegible] (Continuation of preceding) [illegible] 1095.

" 163. [illegible] (Continuation of preceding) [illegible] 1096.

" 164. [illegible] (Continuation of preceding) [illegible] 1097.

" 165. [illegible] (Continuation of preceding) [illegible] 1098.

" 166. [illegible] (Continuation of preceding) [illegible] 1099.

" 167. [illegible] (Continuation of preceding) [illegible] 1100.

" 168. [illegible] (Continuation of preceding) [illegible] 1101.

" 169. [illegible] (Continuation of preceding) [illegible] 1102.

" 170. [illegible] (Continuation of preceding) [illegible] 1103.

" 171. [illegible] (Continuation of preceding) [illegible] 1104.

" 172. [illegible] (Continuation of preceding) [illegible] 1105.

" 173. [illegible] (Continuation of preceding) [illegible] 1106.

" 174. [illegible] (Continuation of preceding) [illegible] 1107.

" 175. [illegible] (Continuation of preceding) [illegible] 1108.

" 176. [illegible] (Continuation of preceding) [illegible] 1109.

" 177. [illegible] (Continuation of preceding) [illegible] 1110.

" 178. [illegible] (Continuation of preceding) [illegible] 1111.

" 179. [illegible] (Continuation of preceding) [illegible] 1112.

" 180. [illegible] (Continuation of preceding) [illegible] 1113.

" 181. [illegible] (Continuation of preceding) [illegible] 1114.

" 182. [illegible] (Continuation of preceding) [illegible] 1115.

" 183. [illegible] (Continuation of preceding) [illegible] 1116.

" 184. [illegible] (Continuation of preceding) [illegible] 1117.

" 185. [illegible] (Continuation of preceding) [illegible] 1118.

" 186. [illegible] (Continuation of preceding) [illegible] 1119.

" 187. [illegible] (Continuation of preceding) [illegible] 1120.

" 188. [illegible] (Continuation of preceding) [illegible] 1121.

" 189. [illegible] (Continuation of preceding) [illegible] 1122.

" 190. [illegible] (Continuation of preceding) [illegible] 1123.

" 191. [illegible] (Continuation of preceding) [illegible] 1124.

" 192. [illegible] (Continuation of preceding) [illegible] 1125.

" 193. [illegible] (Continuation of preceding) [illegible] 1126.

" 194. [illegible] (Continuation of preceding) [illegible] 1127.

" 195. [illegible] (Continuation of preceding) [illegible] 1128.

" 196. [illegible] (Continuation of preceding) [illegible] 1129.

" 197. [illegible] (Continuation of preceding) [illegible] 1130.

" 198. [illegible] (Continuation of preceding) [illegible] 1131.

" 199. [illegible] (Continuation of preceding) [illegible] 1132.

" 200. [illegible] (Continuation of preceding) [illegible] 1133.



